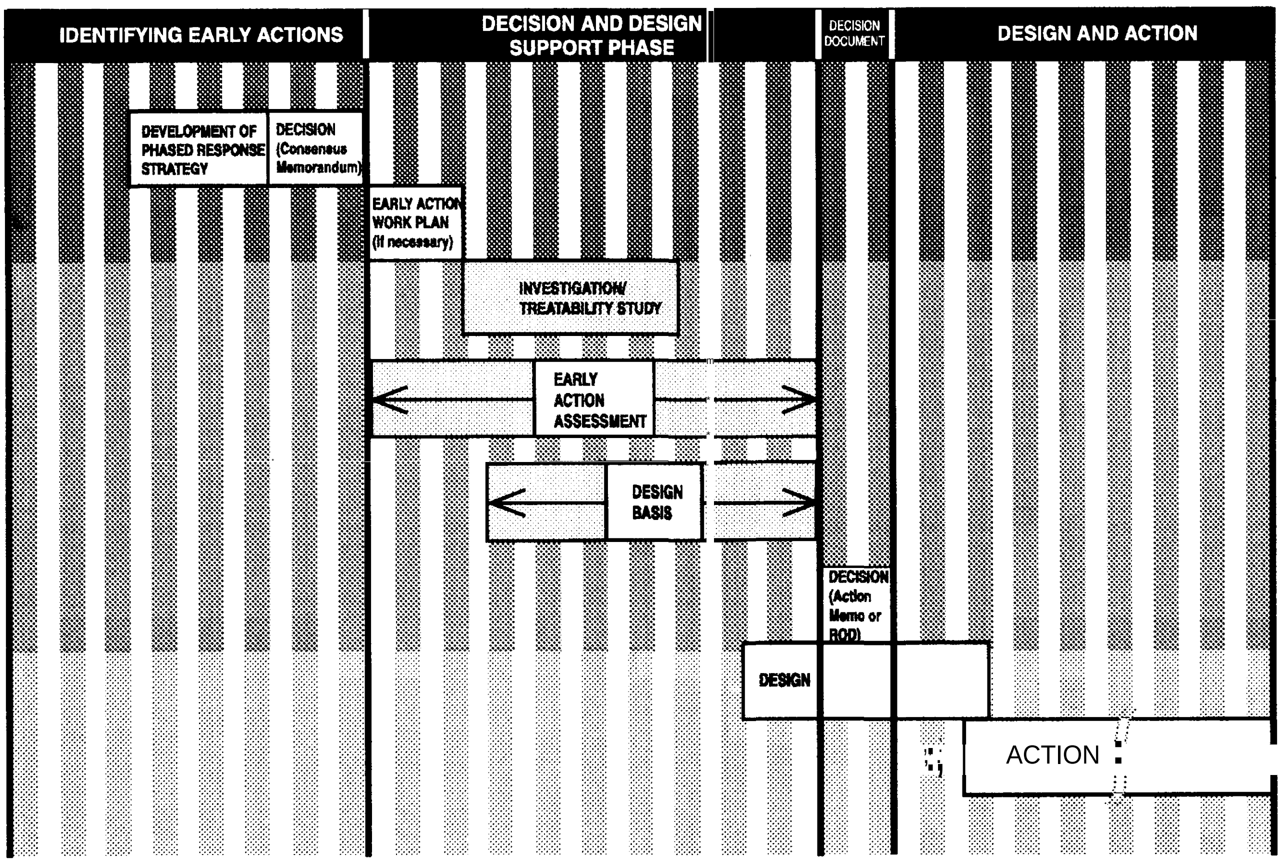
DOE/EH-0506

Environmental Guidance

Phased Response/ Early Actions



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Module 1
Phased Response Strategy

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Module 1. Phased Response Strategy

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Module 1
Phased Response Strategy

Background

Virtually all site problems at Department of Energy (DOE) facilities have been grouped for remediation, typically into operable units. Rarely does a DOE project manager or designee face a challenge to remediate a single site problem. The requirement is always to develop a strategy to move a collection of site problems through the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, eventually remediating all the problems and preparing a portion of the facility for release to its end use. Doing this efficiently and quickly is the challenge.

In any collection of site problems there are likely to be some problems that can be addressed early and others that will require more time for investigation, consideration, phasing with other problem remediations, or even development of new methods or technologies. An efficient strategy will almost always use a sequence of actions, beginning with simple, obvious responses to the more straightforward or urgent problems, and proceeding through more complex responses to the more challenging problems.

This module explains how to identify the most efficient sequence of actions to remediate a collection of site problems. This is called a phased response strategy.

A phased response strategy, which typically should not exceed 10 pages, identifies all the site problems and divides them into those that will be addressed through early actions and those that will have to be addressed through the comprehensive Remedial Investigation/Feasibility Study/Remedial Design/Remedial Action (RI/FS/RD/RA) approach. Identification of candidates for early actions and specific actions to be taken is the primary focus of the strategy. This can be summarized in a simple table or figure.

Specific response actions are started when required according to the strategy. The decision to begin working in earnest on a specific action is documented in a consensus memorandum. A consensus memorandum is a brief statement of intent (approximately 10 pages) that describes the site problem and the scope and general approach for the early action.

Both the phased approach strategy and the consensus memorandum are developed jointly by the extended project team [DOE, the Environmental Protection Agency (EPA), and the state agencies].

Organization

Module 1 is divided into two submodules

1.1 Development of a Phased Response Strategy
1.2 Development of a Consensus Memorandum

Submodule 1.1 Development of a Phased Response Strategy

Phased Response Strategy	
1.1	Development of a Phased Response Strategy
1.2	Development of a Consensus Memorandum

1.1 Development of a Phased Response Strategy
• Identifying All Site Problems in the OU
• Determining Problems That Are Candidates for Early Actions
• Identifying the Authority That Will Be Used for Each Early Action
• Establishing Strategic Objectives for Each Action Identified
• Establishing Consensus on the Phased Response Strategy
• Documenting the Phased Response Strategy

Submodule 1.1 Development of a Phased Response Strategy

Background

A phased response strategy is the primary document used to describe how a sequence of actions will be implemented for a set of site problems. It is the plan for achieving maximum use of early actions to effect risk reduction and to move site problems most quickly to final remediation. The key aspect of a phased response strategy is the consensus that it represents. It should be developed jointly by the extended project team (DOE, EPA, and the State), with DOE in a lead role, and represent an agreement between the major decision makers regarding the best approach to the site problems.

A phased response strategy contains:

- A statement of site problems, including the basis for the site problems (e.g., the current or potential future threat or risk that is posed)
- A table identifying which site problems will be addressed using early actions and which will be left to the final Record of Decision (ROD)
- A list of the type of action (e.g., time-critical removal, early remedial action, final) that will be used to address each site problem
- Brief text explaining the rationale for each assignment
- The primary objectives that each early action will achieve
- A preliminary schedule, through the final remedial action(s)

Organization

Submodule 1.1 discusses the following:

- Identifying and defining site problems
- Determining problems that are candidates for early actions
- Identifying the authority that will be used for each early action
- Establishing strategic objectives for each action identified
- Establishing consensus on the phased response strategy
- Documenting the phased response strategy

In addition, more detailed information is provided in the following notes:

- Note A – Early Action Determinations for Defining a Phased Response
- Note B – Example Process for Early Action Selection of Waste Sites
- Note C – Example Risk Evaluation Methodology
- Note D –Risk Assessment for Early Actions: DOE's Streamlined Risk Evaluation Process
- Note E – Example Strategy Memorandum Outline
- Note F – Example Phased Response Strategy: Weldon Spring Site Remedial Action Project

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Sources

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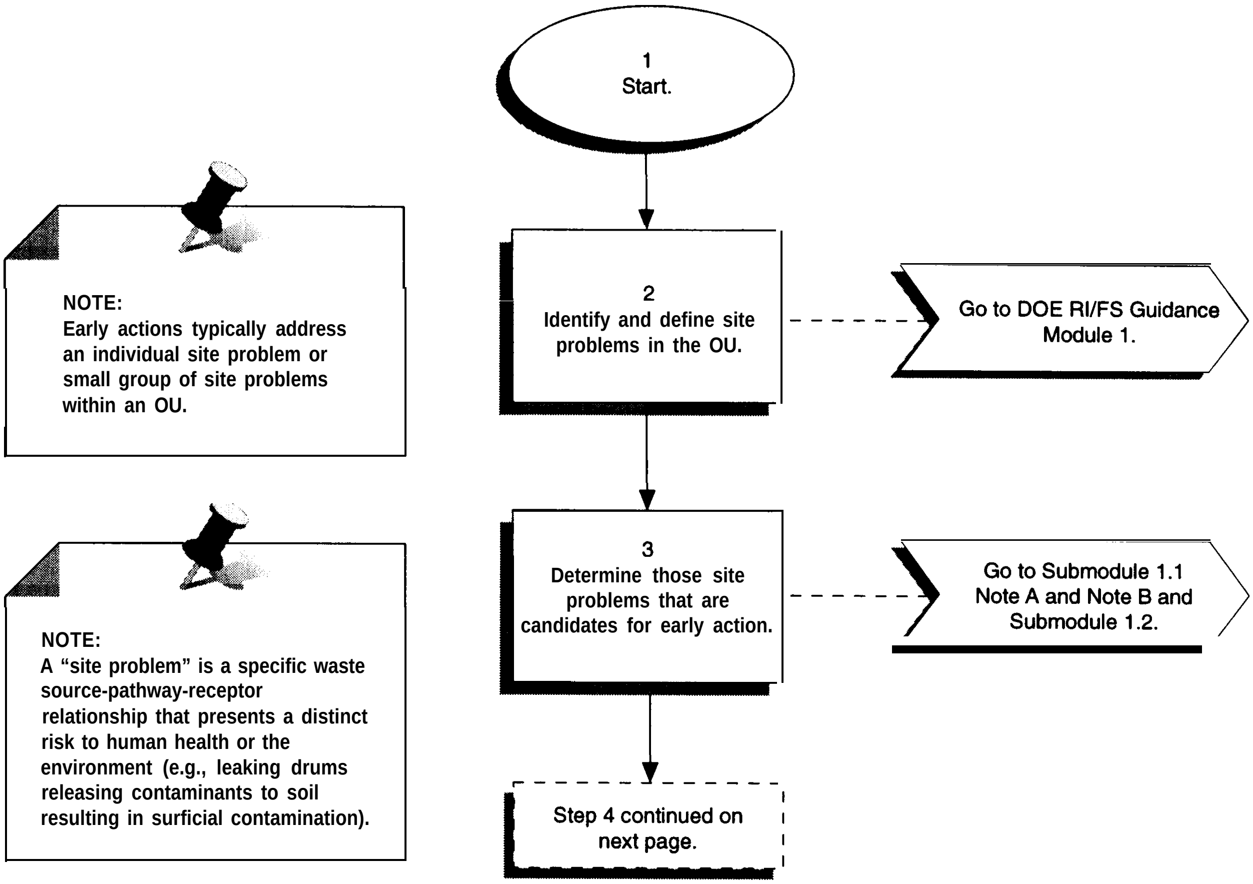
2. *U.S.* EPA, *Guidance for Evaluating Technical Impracticabilipof Ground Water Remediation,* OSWER Directive 9234.2-24.

3. U.S. EPA, *Considerations in Ground-Water Remediation at Superfund Sites and RCRA Facilities,* OSWER Directive 9283.1-06.

4. 40 CFR 300, March 8, *1990, National Oil and Hazardous Substances Pollution Contingent Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 1.1 Development of a Phased Response Strategy



Step 1. Start.

Step 2. **Identify and define site problems in the OU. The** first step in establishing a phased response strategy is identifying and defining specific site problems that constitute the operable unit or other grouping that the strategy will address. It is necessary to develop a phased response strategy around an agreed upon list of site problems.

In general, site problems are discrete aspects that may require remediation. Problems should be definable in terms of an environmental medium (e.g., a contaminated groundwater plume, contaminated soil under a building), geographic features (e.g., the creek banks between river mile 27.1 and river mile 28.3), the types of wastes present or suspected (e.g., low-level debris and trash buried in the old landfill, sludge in the retention basin), or the type of waste units that exist (e.g., tanks, drums, sumps).

Examples of potential site problems are:

- Aboveground tanks leaking hazardous substances onto surface soils (source)
- Runoff from contaminated surface soils into a wetland (pathway)
- Presence of contamination in subsurface soil in concentrations and locations likely to cause continuing groundwater degradation (secondary source)

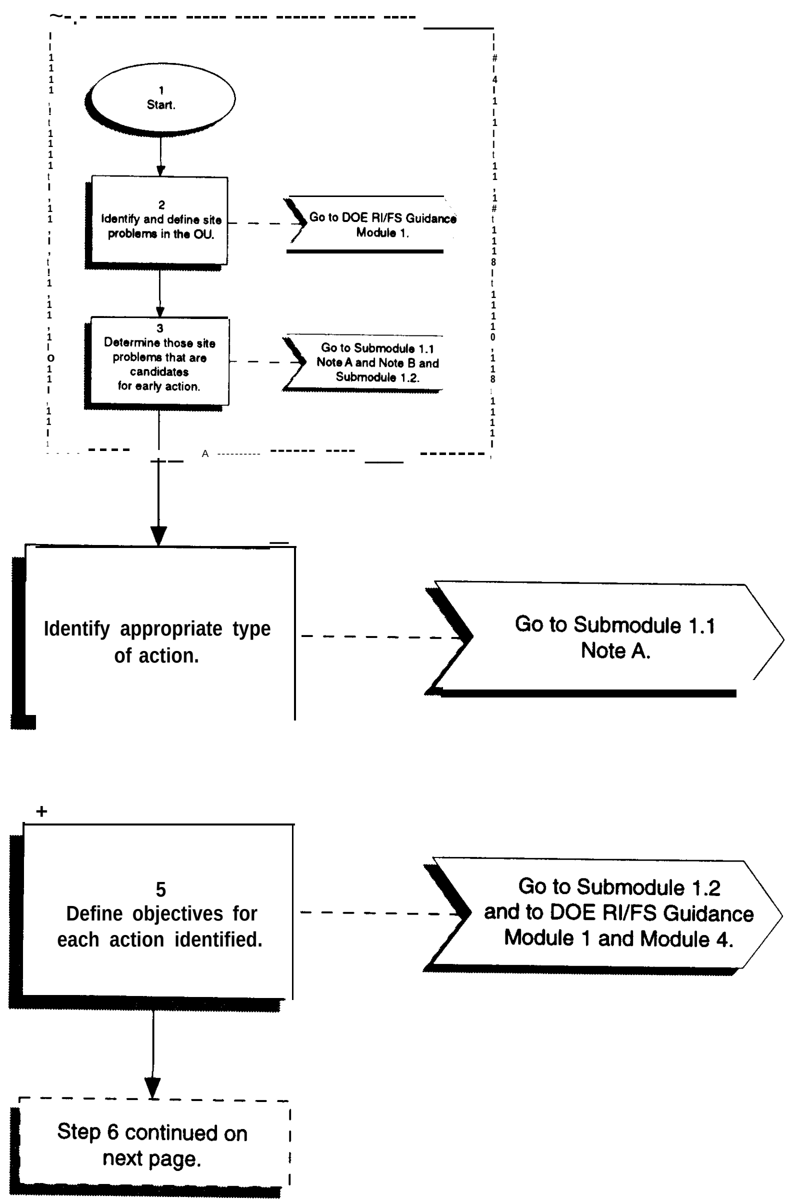
If a conceptual site model has been developed during any RI/FS activities, or will be developed as part of an upcoming scoping effort, it is the most logical place to begin identifying problems. (See DOE's RI/FS guidance, Module 1, Scoping.) The conceptual site model is the primary tool for presenting the known or suspected source-pathway-receptor connections. Site problems are most often developed in terms of sources and pathways and these are the most appropriate for taking early actions (e.g., by removing a source or by shutting off a pathway).

Step 3 . **Determine those site problems that are candidates for early action. The** following criteria are used to determine appropriateness of taking early action:

- The site problem presents a risk or threat of release that warrants response.
- The site problem, or specific aspects of it, can be isolated from the remainder of the site problems and can be addressed separately.
- The site problem can be addressed through an early action. That is, there are relatively straightforward steps that can be taken to mitigate or eliminate the problem.

The extended project team decides how these criteria apply for each site problem, often developing a systematic process for applying these (or similar) criteria toward developing a phased response to site problems. Submodule 1.1, Note A provides additional detail on the three criteria. Submodule 1.1, Note B provides an example process developed by

Submodule 1.1 Development of a Phased Response Strategy (cont.)



NOTE:
Check facility-specific Federal Facilities Agreement to determine early actions available for use at each facility.

NOTE:
Objectives for well-defined early actions are similar to remedial action objectives (RAOs).

DOE-Miamisburg, Ohio EPA, and U.S. EPA to identify site problems that are candidates for early action at Mound.

There are also potential negative indications that must be considered. There may be logistical or other considerations, potential deal killers, that hinder or eliminate the possibility of an early action. A primary example is unavailability of disposal or other waste management capacity that would be required by the action. An early action is clearly not feasible if management capacity will have to be developed or otherwise will not be available for years.

Finally, any early remedial action taken under CERCLA Section 106 has to be consistent with the final actions that will follow. This consideration can inhibit or rule out certain early actions. The matrix in Submodule 1.1, Note A also addresses this consideration.

A site problem is a candidate for early action if it meets the three criteria above, presents no deal killers, and will not be inconsistent with final remedies.

Step4. **Identify appropriate type of action.** The authority for conducting the action must be decided (e.g., time-critical removal, early remedial action). The matrix in Submodule 1.1, Note A, provides a general guide on factors to consider when identifying the appropriate type of action. Consensus of the extended project team should be sought. In some instances, the choices may be limited by sitewide agreements.

The types of early actions differ in administrative procedures (e.g., degree of public involvement required, documentation) or substantive requirements [e.g., requirements to comply with applicable or relevant and appropriate requirements (ARARs)]. The choice among actions can be significant, but in many instances, the specific type of early action selected is not of overriding importance. All of the various types of removal and remedial actions allow opportunities for streamlining and obtaining the advantages described in the Introduction.

Step 5. **Define objectives for each action identified.** Clear objectives should be established for each action in the phased response strategy. The objectives should identify how the early action will contribute to the overall remediation of the site.

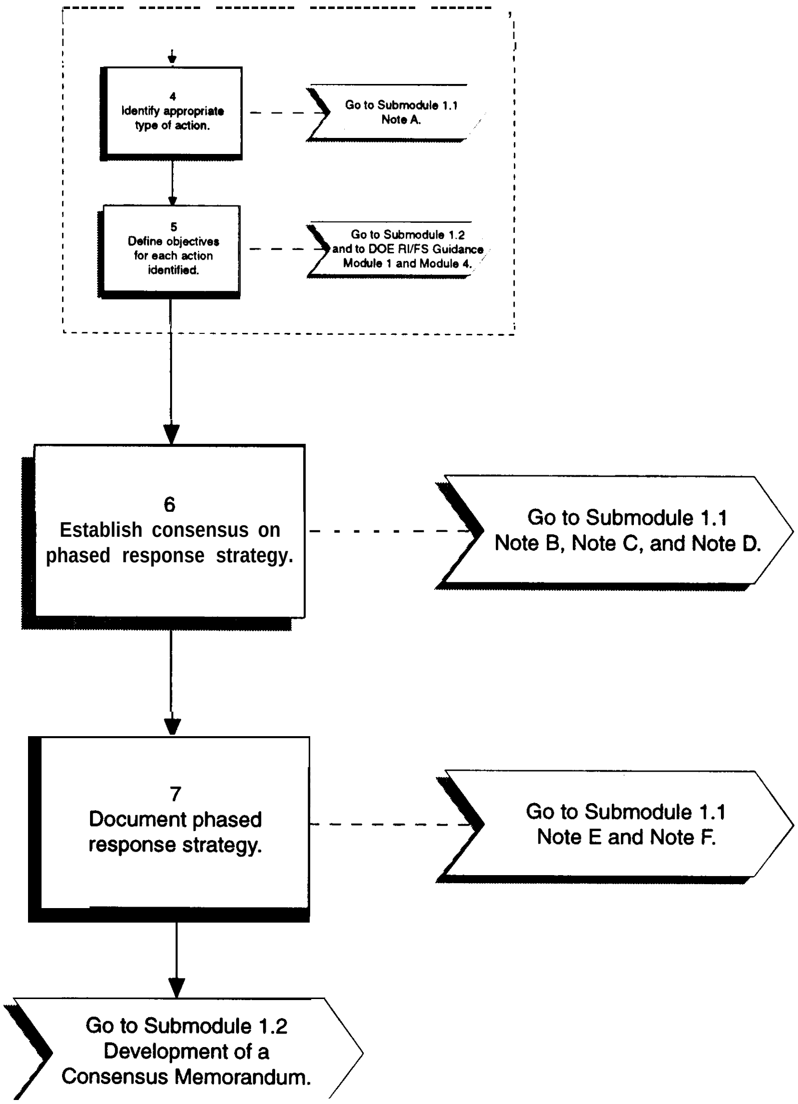
The objectives are similar to preliminary remedial action objectives (RAOs) established during an RI/FS (see DOE's RI/FS guidance, Module 1, Scoping).

Example objectives are:

- Remove the leaking underground waste tanks and all visibly contaminated subsurface soils. The action will not involve removing the tanks that do not appear to be leaking, but will include pumping wastes from those tanks and flushing the tanks.

- Identify, stabilize, and stake all radioactive hot spots within the unfenced portion of the OU. Hot spots are defined as areas contaminated above the agreed upon interim background levels established in [reference document (e.g., the facility-wide Sampling and Analysis Plan)]. Hot spots within the fenced areas will be addressed through a later action.

Submodule 1.1 Development of a Phased Response Strategy (cont.)



NOTE:
To be effective, phased response strategies must reflect a consensus of the project team.

- Install runon/runoff controls to prevent erosion-contminated flows from reaching [name receptor]. If possible, control will be established without capping the contaminated areas, which would lead to increased wastes to be managed at final remediation.

  In formulating objectives there is value in listing not only the site problems to be addressed and the actions to be taken, but also problems that will not be addressed (e.g., "these" hot spots, but not "those" hot spots). Such negative scope statements sharpen the focus of the actions,

Step6. **Establish consensus on phased response strategy.** A phased response strategy must reflect a consensus of the extended project team, particularly the regulators. One or two meetings and later exchanges of the drafts are appropriate methods for reaching consensus. It is necessary to achieve consensus on all steps to this point, including:

- **Method(s) for and identification of site problems and candidates for early actions.** While health risk is one factor that may be used for identifying site problems and candidates for early action, it is not the only factor. Others include historical knowledge, presence or lack of a complete exposure pathway, existing site standards [e.g., Preliminary Remediation Goals (PRGs)], site precedent, and background levels. Submodule 1.1, Note B provides an example of one method designed by an extended project team for identifying early actions. In addition, Submodule 1.1, Note C provides an example of a risk evaluation methodology agreed to for identifying site problems.

- **Identification of objectives for each early action.** Several issues, if resolved, can be used to establish objectives for early actions. These include development of interim cleanup levels, identification of applicable ARARs, designation of land use, and use of institutional controls. Additionally, agreement for the use of innovative technology can help establish whether the objective of an early action is, for example, specific cleanup or demonstration. Submodule 1.1, Note D provides additional information on processes that could be used to help establish remedial action objectives on the basis of risk assessment approaches for early actions.

- **Identification of site problems deferred to a comprehensive RI/FS/RD/RA.** Factors that may lead to deferring a site problem to the comprehensive RI/FS/RD/RA include unresolved issues such as disposition of remediation wastes, inability to reach consensus on what constitutes a site problem, inability to identify an objective for an early action, or inability to identify a potential response (e.g., unavailability of technology).

At this point, issues in each step should be resolved to the extent possible. Any unresolved issues weaken the strategy and can eventually result in delays or even abandonment of organized early action effort. Only general consensus is required at this point; more detailed consideration of each of these points is possible during the development of the consensus memorandum that initiates each early action.

Step 7. **Document phased response strategy.** A separate strategy document is not required. A phased response strategy can be documented in whatever existing documents are

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appropriate, such as a site management plan or site strategy document. Where no existing documents can serve, a separate memorandum can be developed to summarize the phased response strategy.

The phased response strategy should be kept as short as possible (10 pages or less may be a reasonable target). Most of the information should involve simple declarative statements regarding what has been agreed upon. A key element is a table or flowchart that presents all of the site problems and the action(s) envisioned (early or final) for each problem, and that indicates any site problems for which an agreed upon course of action has not been established.

The phased response strategy should also acknowledge any unresolved issues (e.g., land use) and provide working assumptions that will guide implementation of the early actions until better information is available. For example, an assumption might state, "On the portion of the site that will remain under DOE control for the foreseeable future, the land use will be assumed to be industrial, until a final land use decision is made in the final ROD. "

Submodule 1.1, Note E provides an example outline for a phased response strategy memorandum. Submodule 1.1, Note F provides an example phased response strategy.

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Note A. **Earlv Action Determinations for Definining a Phased Response.**

The following matrix presents the criteria which identify appropriate candidates for the various CERCLA response actions. It is arranged into the three categories identified in Step 3: Threat of Release/Risk, Potential Response, and Scope of Response. It also discusses consistency with final remedies, an important modifying consideration in identifying candidates for early action.

In addition to identiying candidates for early action, the phased response strategy must identify the appropriate type of action for each site problem. Each type of action (e.g., time-critical removal, non-time-critical removal, early remedial) has distinguishing characteristics. These characteristics are the main point of interest in the matrix that follows.

The matrix was developed largely from the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) preamble and final rule, as well as interpretations from EPA guidance documents. It can serve as a basis for discussions among the extended project team for appropriate use of early actions in a phased response.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Threat of Release/Risk	**Nature of Threat**	Threat from site problems substantial enough to warrant response.	Threat from site problems substantial enough to warrant response.	Threat from site problems that almost certainly will exceed the final cleanup standards for site problems. For example, high levels of contamination flowing directly into a creek.	Threat from site problems that have been shown through the RI or risk assessment to exceed final remediation levels or to exceed final ARARs.
Threat of Release/Risk	**Objectives**	Reduce risks from site problems to levels consistent with final cleanup standards (if they are clear or defined) or to remove immediate threats.	Reduce risks from site problems to levels consistent with final cleanup standards (if they are clear or defined). Site problems selected for action may be those that (1) require near-term action, (2) are most amenable to remediation, (3) are least hampered by lack of site information, (4) are least encumbered by ARARs or other regulatory requirements, or (5) have a remediation decision that will be least controversial. Risk is one factor in this range of considerations.	Same as non-time-critical removals.	All long-term risks from site problems to human health or the environment are remediated.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Threat of Release/Risk	**Certainty of Threat**	Threat supported largely by available data; limited data collection may be required to determine extent of threat.	Available information is typically sufficient to support the need for remediation. Additional information is often required to establish the extent of the threat or to optimize the envisioned action.	Same as non-time-critical removal.	RI/FS evaluates all potential (or remaining) threats and discusses their certainty as part of final remediation decision. Threats are certified by a baseline risk assessment.
Potential Response	**Implementability Considerations, Including Waste Management**	Readily available equipment, waste management, and other logistical issues can be resolved before the end of a 6-month planning period. Waste management often limited to interim storage or available onsite or commercial capacity. Development of dedicated treatment, storage, or disposal capacity is generally not feasible.	Implementability requirements can be up to the level of complication involved in final remedies. ARARs and other regulatory requirements can be met to the degree practicable or waived (temporarily) thus making implementability greater than for the same action as final. Development of dedicated treatment, storage, or disposal capacity may be feasible.	Same as for non-time-critical removal.	Potentially, any level of implementability challenges can be accommodated. An exception is absolute requirements, such as disposal needs for which no option can be identified or remediation for which no feasible alternative exists. Planning time to identify and resolve implementability problems is factored into ROD.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	**Non-Time Critical**	**Early**	**Final**
Potential Response	**Evaluation Needed**	Six-month planning horizon allows evaluation of the alternative(s) being considered, but detailed evaluation is not required. Draft Action Memorandum explains alternative(s) in terms of implementability, effectiveness, and cost. No comparative evaluation is required (e.g., only one alternative may be considered).	More formal evaluation of alternatives in EE/CA is required, but this cm focus on a few alternatives.	Evaluation is in the Focused Feasibility Study (FFS). The nine criteria in the NCP are the basis of the evaluation. No comparative evaluation is required (only one alternative may be considered).	Detailed evaluation of a range of alternatives, including the no-action alternative, is required in the FS. Both a detailed analysis and a comparative analysis of the alternatives generally are conducted. The nine criteria in the NCP are the basis for the evaluation.
Potential Response	**Consistency with Final Remedy**	Some consideration of consistency with potential final actions may be possible during the limited time available for planning. Such consistency does not stop action. Actions that would clearly inhibit or render much more difficult any of the potential final actions should be avoided.	Consideration of consistency with potential final actions should be given significant consideration during the planning for the action. Consistency can be a reason to delay action until final ROD because of the lower urgency of the situation. Actions that would clearly inhibit or render much more difficult any of the potential final actions should be avoided.	Same as non-time-critical removal.	Not applicable.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Scope of Response	**Investigation Possible/Required**	Some investigation to clarify critical aspects of the site problem(s) is typically possible and/or necessary. Not necessary to establish quantitatively the risks involved or the potential for the envisioned action(s) to meet ARARs.	An LFI is commonly necessary. A baseline risk assessment is not required, although a qualitative risk assessment is required to support the decision to take action. Limited investigation to support the design (including development of contingency plans) is typically required.	Same as non-time-critical removal.	Required investigation is driven by the need to (1) develop a conceptual model of the site; (2) complete a baseline risk assessment and ARARs analysis; (3) develop and analyze a complete range of alternatives; and (4) provide adequate protection to worker health and safety and the environment during remediation. Generally, more data are needed to support all of these purposes than would be required simply to identify and implement the likely best remediation approach.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	**Non-Time Critical**	**Early**	**Final**
Scope of Response	**Scope of Action**	Limited actions that rely on existing technologies to address well-defined site problems.	Actions that use established or reasonably reliable technologies. Not necessary to address all site problems; a subset of well-defined, immediately remediable problems may be targeted.	Same as for non-time-critical removal.	Actions that remediate all site problems to meet statutory requirements. Because the scope is to address all threats to human health or the environment, long-term and/or difficult remedial actions or actions with limited assurance of success may be necessary.
Scope of Response	**Cost Limits**	Costs are limited by the availability of pre-programmed funds and/or re-prograrnmable funds. DOE is not restricted by CERCLA statutory limits on fund-financed removal actions.	Same as for time-critical removal.	No cost restrictions apply from the statute. Costs are limited by the availability of pre-programmed funds and/or re-programrnable funds.	Same as for early/ interim remedial action.
Scope of Response	**Stakeholder Involvement**	Extended project team consensus on response is required. Public notice prior to the response is usually possible and desirable. Formal public comment period not usually feasible during the 6-month planning, although a comment period is required once the administrative record is available.	Time is available for public involvement. Public comment period required. Draft action memorandum can be made available for public comment.	Time is available for public involvement. Public comment period required. Proposed plan is made available for comment. Administrative record to support decision is required and is made available to the public.	Extensive stakeholder involvement throughout the scoping, investigation, and decision phases is valuable and required.

Criteria	Factor	Non-Emergency Removal Actions		Remedial Actions	
		Time Critical	Non-Time Critical	Early	Final
Scope of Response	**Ability to Tolerate Limited Success of Action**	Degree of success should be more certain than for **an** emergency removal. Six months are available to increase this likelihood. However, the brief planning horizon frequently means that full success cannot be guaranteed. Partial success scenarios should be considered as reasonable deviations, and contingency plans should be developed as needed. Further site actions, even if delayed until the final ROD, are likely following any time-critical removal.	Success of the limited actions being undertaken should be assured to a reasonable level by the LFI (if any) and by identification of potential deviations and contingency plans. Because the action is not necessarily the final action, some ability exists to tolerate partial success, given that later, final actions are likely and can be used to repair any inadequacy in the initial response.	Same as non-time-critical removal.	Because these are the final actions, success should be relatively assured. Investigation, planning, and design time are not limited. Because it is desirable for the final actions not to have to be followed by any additional actions to repair inadequacies, tolerance of limited success is lower than for any other type of CERCLA action.

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Note B. **Example Process for Earlv Action Selection of Waste Sites.**

Mound has developed a strategy that will aggressively clean up and release portions of the site. A critical step in implementing this strategy is to determine what action, if any, is required at more than 350 potential release sites (PRSs). The agencies plan a phased response, primarily through removal actions. Mound will conduct removal actions at all PRSs that require response. An RI/FS to support a final ROD will be coordinated with the removal action process. Data collected during the evaluation of PRSs and during removal actions will support the RI/FS. DOE will release blocks of land and buildings as removal actions are completed.

The following example illustrates a process used by Mound to categorize PRSs. DOE, U.S. EPA, and Ohio EPA jointly developed the removal site evaluation (RSE) process with technical support from DOE's contractor at Mound. The example illustrates the use of the RSE process for determining whether a removal action is necessary at a PRS.

Several features of the RSE process should be noted:

- The RSE process has only two outcomes – a PRS either requires a response action or it does not.

- The RSE process uses surrogates for quantitative risk (e.g., historical knowledge, presence of complete exposure pathways, PRG levels) to support the development of a "consensus memorandum. " Thus, only qualitative evaluations of risk are used to support the need for the removal actions. Quantitative risk (i.e., a baseline risk assessment) will support development of a final ROD when the RI/FS is completed.

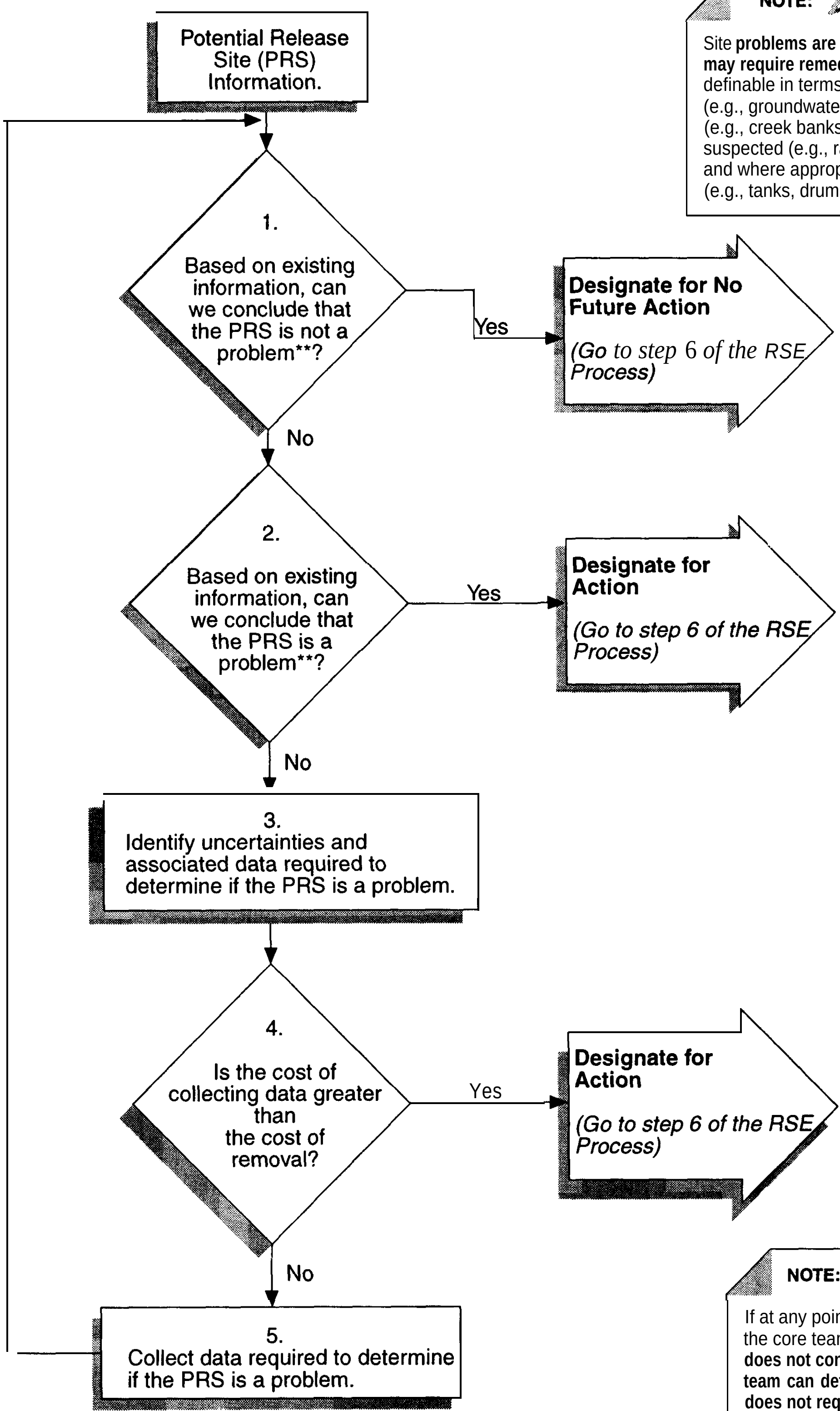
- The process integrates stakeholders. The Mound core team will ask stakeholders to comment on the team's recommendation for each PRS. After the stakeholders have commented, the agencies will sign a "consensus memorandum" to document the action/no action decision.

Removal Site Evaluation (RSE) Process	
1.1 The purpose of the RSE Process is to: 1) determine site uncertainties, potential data needs, and ultimately the appropriate response action for each PRS; and 2) communicate the recommendations of the core team to the stakeholders and provide a forum to receive their input.	**The core team is defined as DOE-MB, U.S. EPA Region V, and Ohio EPA.**
The extended project team developed a process flow diagram to evaluate the individual PRS, determine the appropriate response action, and solicit stakeholder input, (Figure 1). The RSE process will be the primary mechanism by which the core team will establish whether a PRS represents a site problem.	**The extended project team includes DOE-HQ, Ohio Department of Health, and DOE-MB's contractors, in addition to the core team.**
Four elements must be present for a PRS to be considered a potential site problem: 1) a source of contamination, 2) a release mechanism, 3) a current or future exposure pathway/route, and 4) a receptor(s).	**Definition of site problem.**
For some PRSs it will be obvious that there is, or is not, a site problem. In other cases, this determination will be less clear and the development of a conceptual site model will be useful in evaluating if a complete exposure pathway exists. If a complete exposure pathway does exist, then risk-based analysis may be required to determine if the PRS poses an unacceptable risk.	**When a risk-based approach may be necessary.**
During the RSE process the core team will categorize the PRSs in the following groups, thus determining the next steps: 1) sites that require no further action (NFA) based on existing information (i.e., no problem exists at the site); 2) sites for which a response action is warranted based on existing information (i.e., a problem does exist); and 3) sites for which there is insufficient information available to make a determination (i.e., not sure if there is a problem).	**Categories for PRSs.**
2.1 Description of RSE Plow Diagram The RSE process developed by the Mound team is described below and illustrated in Figure 1. *[Note; All PRSs within a geographical area being evaluated for release will be run through Steps 1 and 2, and where appropriate 3, before proceeding to Steps 4 and 5.]*	

1. <u>Evaluate existing information to determine if the PRS is not a site Problem</u> –This step may be straightforward and obvious. There are a number of criteria that the core team can use to determine that a PRS is not a site problem, based on common sense factors. Examples include:	**Evaluation to determine whether PRS requires no further action.**
• Historical knowledge;	
• Lack of a complete exposure pathway (current or future);	**Risk-surrogates.**
• Existing site standards;	
• Background (either naturally occurring or anthropogenic); and	
• Precedent.	
Risk information also may be used to initially designate a PRS as an area that is not a site problem.	
The core team may decide that the development of a conceptual model is necessary to evaluate if a complete exposure pathway exists. If a complete exposure pathway does exist, or if uncertainty exists as to whether a NFA designation is appropriate, proceed to Step 2 for further evaluation. If the core team determines that the site is not a problem, that PRS will be designated for NFA, pending stakeholder consensus. Skip to Step 6 in the RSE process.	
2. <u>Evaluate existing information and data to determine if the PRS is a site Problem</u>–This step also may be straightforward and obvious, and the core team can use the common sense criteria listed in Step 1 to designate a PRS as a site problem. Similarly, the core team may decide that development of a conceptual site model during this step is necessary to define the problem. If the core team concurs that data and information for the PRS clearly indicate that conditions warrant a response action, then proceed to Step 6 in the RSE process. Further evaluation to determine specifics for implementing a response action, if needed, will be conducted as part of the response action process (Section 3).	**Evaluation to determine if a PRS is a problem requiring action.**
If all four elements of a complete exposure pathway are present, but the degree of risk posed is uncertain, further data collection, field characterization, and/or more quantitative risk evaluation may be required. Proceed to Step 3.	

3. Identify uncertainties and data needs –For PRSs where the existence of a site problem is uncertain, the core team will develop a conceptual site model. The conceptual site model summarizes everything that is known about the PRS, identifies probable and possible pathways and receptors, and identifies areas of uncertainty (e.g., addresses whether pathways are complete and if contaminant concentrations exceed acceptable levels). Based on the conceptual site model, the core team will conduct an evaluation of the uncertainties and will identi~ what data are needed to determine if the PRS is a site problem.	**Data needs identified for further assessment.** **How uncertainties will be managed.**
4. Compare data collection costs to removal costs – For some PRSs (particularly small sites) it may be less expensive to perform a response action than to collect sufficient data to determine if a problem exists. The core team will informally compare the cost of data collection to the expected cost of a response action (including disposal costs) before data are collected. If the expected cost of a response action is clearly less than the cost of characterization, the core team will designate the PRS for a response action.	
5. Collect data required to determine if the PRS is a ~roblem– If more data is required to determine if the PRS constitutes a site problem, DOE-MB will collect the necess~ data and the core team will re-evaluate the PRS following the RSE decision logic. *[Note: ~ at any point in the RSE process the core team concludes a PRS does not pose a site problem, the PRS can be categorized for NFA and the core team should skip to Step 6 in the RSE process.]*	
6. Present Preliminary recommendations to stakeholders for input – The core team will present the recommendations developed through Steps 1-5 of the RSE Process (i.e., either to initiate a response action or to take NFA). The data and/or information and the rationale to support each recommendation will be summarized in the format of a PRS fact sheet. The PRS fact sheet will include: • A description of the PRS, including process history; • A photograph of the PRS; • A summary of the data and indicated levels of contamination at the PRS;	**Integrating stakeholders by presenting PRS recommendations.**

RSE Process



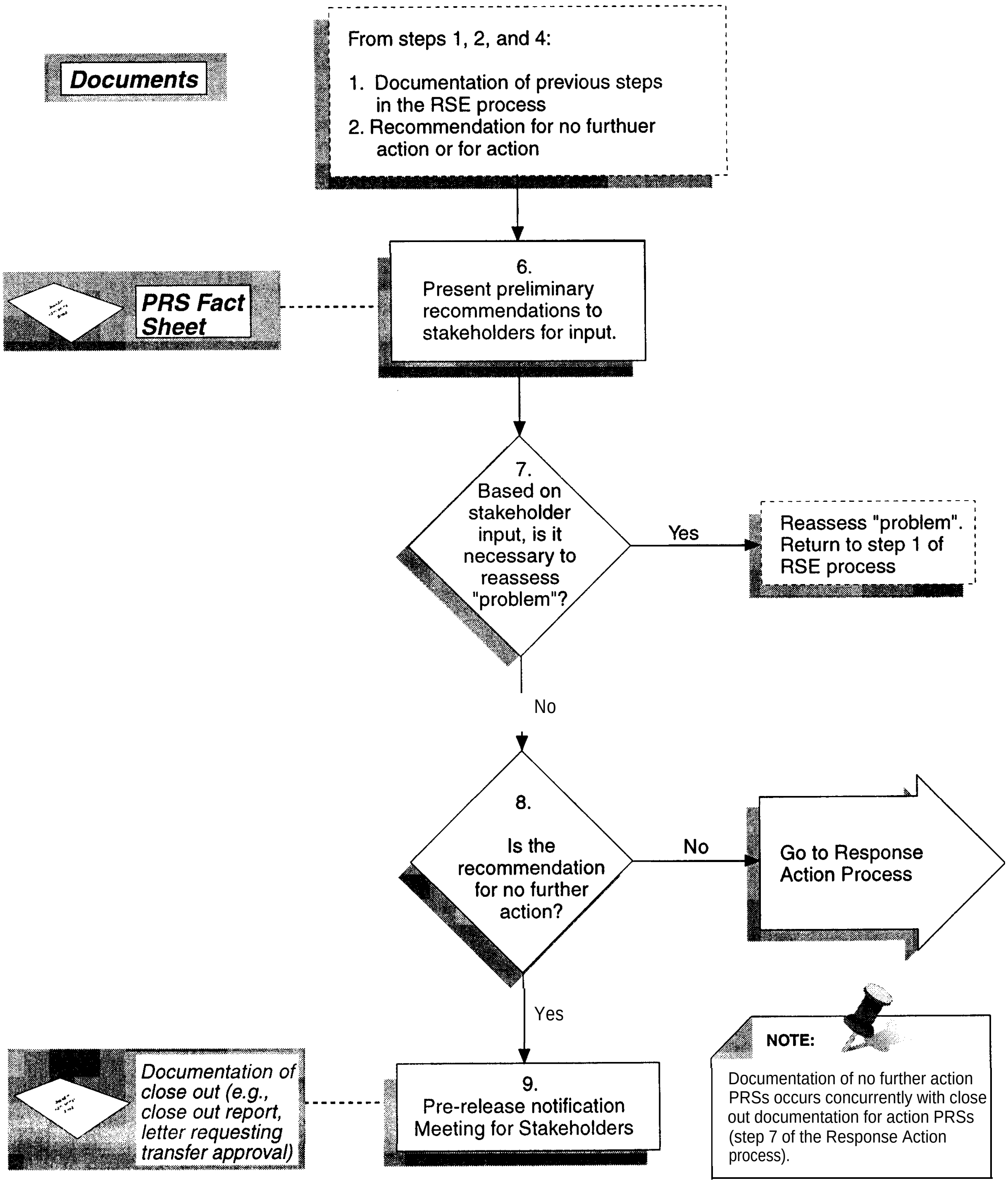
NOTE:

Site **problems are discrete areas of a site that may require remediation; problems should be** definable in terms of an environmental medium (e.g., groundwater, soil); geographic features (e.g., creek banks); types of waste present or suspected (e.g., radioactive sludge, metals); and where appropriate, the type of waste units (e.g., tanks, drums).

NOTE:

If at any point during this process, the core team agrees that the **PRS does not constitute a problem, the team can determine that the PRS does not require any further action.**

RSE Process (cont.)



• References from which data are summarized; • Conclusions/recommendations of the core team. *[Note: For each Predesignated as a site problem, a problem statement (i. e., a concise statement which describes why the PRS constitutes a site problem) and a conceptual model will be included.]*	
The purpose of this step is to solicit stakeholder involvement early in the process so that their input can be used to help guide program decisions and site remediation strategy. Stakeholders will be asked to review the core team's recommendations, focusing on the problem statement. If stakeholders disagree with the designation of a PRS as either a site problem or as an area requiring NFA, they will be asked to provide input that will either eliminate, create, or modify a problem statement.	**Developing consensus.**
7. Determine whether it is necessarv to reassess "problem" – Evaluate stakeholder input and, if necessary, reassess the PRS through Steps 1-5 of the RSE process. A PRS warrants reassessment under two scenarios: (1) If *stakeholder input eradicates or resolves the problem statement of a PRS.* This situation could occur, for instance, if stakeholders express an interest in a specific land use which consequently eliminates the potential exposure pathway of concern and effectively eradicates the problem statement for that PRS. (2) If *stakeholder input results in a statement of concern or a problem statement for a PRS designated for NFA.* This situation could occur for instance if stakeholders express an interest in a specific land use (e.g., residential) that could result in increased exposures or new exposure pathways. When stakeholder input simply adds to or modifies a problem statement, revisions to the core team's recommendation based on this input will be addressed in the response action process (see Section 3) and a formal reassessment will not be required. For those PRSs that do not require further assessment, proceed to Step 8.	**Resolving disagreements.**

8. <u>Finalize recommendation</u>-At this point in the RSE process, each PRS is either recommended for either (1) a response action or (2) NFA, based on core team consensus. After receiving stakeholder approval, the recommendation is final. If the PRS has been designated as a site problem that requires action, proceed to the response action process (Section 3). If the PRS has been designated for NFA, proceed to Step 9. 9. <u>Conduct a Pre-Release Notification Meeting for Stakeholders</u> – DOE-MB will document the designation for NFA (e.g., develop a close out report for a PRS or draft a letter that requests land transfer approval for a release block) and present the documentation to stakeholders. DOE-MB also will submit the close out documentation to regulators for approval. *[Note: Close out documentation for NFA PRSs occurs concurrently with close out documentation of action PRSs in Step 8 of the response action process.]*	**Develop consensus memorandum.**

<u>Note C</u>. **<u>Example Risk Evaluation Methodologv</u>.** This note provides a summary of the decisions made during the development of the risk evaluation methodology to evaluate PRSs on the basis of human health risk.

As part of developing are moved action-based approach (i.e., a phased response strategy), DOE, U.S. EPA, and Ohio EPA have jointly developed an RSE process to categorize PRSs and to identify candidates for early action at DOE's Mound Plant in Miamisburg, Ohio (see Submodule 1.1 Note D for more detail). The agencies determined that a variety of criteria may be used to categorize a PRS [for early action, further assessment (i.e., deferred), or no-action] including historical knowledge about a PRS, comparison of PRS contaminant concentrations with established cleanup standards, and comparison of PRS contaminant concentrations with background concentrations. A PRS is evaluated on the basis of the risk it poses to human health, only if the PRS cannot be categorized on the basis of these criteria.

To evaluate PRSs on the basis of risk, the agencies jointly developed a risk evaluation methodology that compares the concentration of contaminants at the PRS with risk-based concentrations known as Guideline Values. Guideline Values are similar in concept to PRGs because they represent a risk-based concentration of a contaminant in a specific medium. Hence, the "104 Guideline Value" for a contaminant is the concentration of that contaminant that yields a cancer risk of 1×10^{4} (1 in one million). Calculating Guideline Values requires making multiple assumptions about potential receptors, exposure scenarios, and other parameters typically used to calculate risk.

Reaching consensus on the appropriate Guideline Values was a collaborative effort that involved researching and discussing a wide range of risk-related issues. To address these issues, a team of risk assessment professionals from the three agencies worked cooperatively to generate recommendations for discussion by the sitewide Mound team. Based on the recommendations of the "risk team, " consensus was reached on the following elements, which form the foundation of the risk evaluation methodology:

- Exposure scenarios. Because there is consensus that the future use of the property will be industrial, the risk evaluation is based on two receptors that represent individuals that may be exposed in an industrial setting. These receptors are the outdoor construction worker and the indoor worker.

- Exposure routes. Both the outdoor construction worker and the indoor worker are assumed to ingest small amounts of soil, inhale small amounts of dust from the soil, be externally exposed to possible radiation from the soil, and drink about a quart (1 liter) of water per day from a groundwater well on the property. The outdoor construction worker is assumed to ingest and inhale greater amounts of soil and dust and may also shower in water from a well on the property (possibly inhaling small amounts of vapor while showering).

In general, dermal exposure is not evaluated except for PRSs containing contaminants that are known to be of concern from dermal exposure [e.g., polycyclic aromatic hydrocarbons (PAHs), As, Be, Cd). Surface water exposure is not expected to be a concern. However, if surface water exposure is a risk concern for a specific PRS, Guideline Values based on recreational surface water exposure will be used as a conservative upper bound for screening PRSs.

- Exposure duration and frequency. In accordance with EPA guidance, the exposure duration for the indoor worker is assumed to be 25 years. Because Mound construction projects have historically lasted no longer than 2 to 5 years, an exposure duration of 5 years is used for the outdoor construction worker. Both the outdoor and indoor worker scenarios assume the worker is exposed 8 hours per day, 250 days per year.

- Exposure area and exposure concentration. The sitewide Mound team discussed the reasonable area over which a person could be exposed by working an 8-hour day and agreed to use the precedent of 1/2 acre for screening purposes during the RSE process. The contaminant concentration that is compared with the Guideline Values is recommended to be the 95 percent upper confidence level of the mean concentration over an area of 1/2 acre surrounding the PRS,

  For radiological contaminants reported as “nondetects,” the actual laboratory value will be used to compute the exposure concentration. For nonradiological contaminants, nondetects will be estimated as one-half the detection limit as long as there is at least one hit of the contaminant within the exposure area of 1/2 acre. If no hits exist, the contaminant need not be evaluated.

- Risk threshold. If the PRS contaminant concentration exceeds the Guideline Value equivalent to a risk of 10^{-4}, the PRS is a definite candidate for early action. If the PRS contaminant concentration exceeds the Guideline Value equivalent to a risk of 10^{-6}, the PRS is a probable candidate for early action. A 10-b threshold was selected because setting a 10^{-6} risk level for individual contaminants will generally lead to cumulative risks within the 10^{4} to 10^{-6} target risk range. If the PRS contaminant concentration is less than the Guideline Value equivalent to 10^{-6}, the PRS is not a candidate for early action. For noncarinogenic contaminants, the threshold for individual contaminants is a hazard quotient of unity.

Note D. **Risk Assessment for Early Actions: DOE's Streamlined Risk Evaluation Process.**

This note provides the fill text of an Information Brief guidance developed and published by EH-41, DOE's Office of Environmental Policy and Assistance. It presents the risk assessment requirements that must be met to support an early action, the data needed, and four approaches to performing a streamlined risk evaluation (SRE). Because the risk assessment is being used to decide whether to take early action, but not to preclude any potential actions (as opposed to a baseline risk assessment, which may be used to support taking no action), the standard of proof of risk is lower than required to support a full RI/FS/RD/RA process; qualitative and/or comparative approaches are fully acceptable. A main point is that, whatever approach or combination of approaches is taken, it must be the result of a consensus between the regulatory agencies and DOE.

Streamlined Site Characterization
Approach for Early Actions:
Impact on Risk Assessment Data Requirements

Background: The U.S. Environmental Protection Agency (EPA) has developed the Superfund Accelerated Cleanup Model (SACM) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to promote increased efficiency and shorter response times in remediating contaminated sites. The SACM approach requires a prompt reduction of risk through removal actions or presumptive remedies. Under the Resource Conservation and Recovery Act (RCRA) corrective action program, EPA also has developed the Stabilization Initiative to reduce site risk, i.e., risk from solid waste management units (S-WMUs) or Areas of Concern (AOCs), by early implementation of institutional control or interim measures. Since actions undertaken by CERCLA and RCRA are risk driven, risk assessments also need to be streamlined to support early response actions (Figure 1). The Streamlined Risk Evaluation (SRE) serves this purpose by assessing risk qualitatively; utilizing site-specific hazard and exposure information, incident reports, and health advisory data; and/or comparing available chemical data to published risk-based concern levels such as preliminary remediation goals (PRGs). A quantitative SRE, similar to a screening baseline risk assessment under RCRA and/or CERCLA, may be used to determine the need for further remedial action after an early action is completed. This Information Brief presents the concepts and data requirements for SREs and explains how the SRE may be used to support a baseline risk assessment (if required) to be performed in the CERCLA remedial or RCRA facility investigation project phase. Data needs for SREs should consider time and cost, data useability, and the potential of overestimating risk by the use of assumed data.

Statutes: CERCLA Section 104 (Response Authorities), Section 120 (Federal Facilities), and Section 121 (Cleanup Standards); RCRA Corrective Action Authorities, i.e., Sections 3004(u), 3004(v), 3013, 3005(c)(3), 3008(h) and 7003; and Section 6001 as amended by the Federal Facility Compliance Act (FFCA).

Regulations: 40 CFR 300.430(d), 40 CFR 300.430(e); 40 CFR 264.101, 264 Subpart F, and 40 CFR 264 Subpart S proposed rule (55 FR 30798, July 27, 1990)

Referencess:

1. "Guidance on Implementation of the Superfund Accelerated Cleanup Model (SACM) under CERCLA and the NCP," OSWER Dir. 9203.1-03, EPA (7/92)

2. "Presumptive Remedies: Policy and Procedures," OSWER' Dir. 9355.0-47FS, EPA (9/93a)

3. "Presumptive Remedies: Site Characterization and Technology Selection for CERCLA Sites with Volatile Organic Compounds in Soils," OSWER Dir. 9355. O-48FS, EPA (9/93b)

4. “Presumptive Remedy for CERCLA Municipal Landfill Sites,” OSWER Dir. 9355. O-49FS, EPA, (9/93c)

5. “RCRA Corrective Action Stabilization Technologies Proceedings,” EPA/625/R-92/O14 (10/92)

6. “Remedial Investigation/Feasibility Study (RI/FS) Process, Elements, and Techniques,” Module 7 Streamlined Approach for Environmental Restoration (SAFER), DOE EH-94007658 (12/93)

Why streamline site characterization?

The benefit of streamlining site characterization is that the process facilitates early actions. Based on lessons learned from over ten years of cleaning up Superfund sites, EPA has found that common remedial actions (presumptive remedies) often can be selected for certain types of sites (EPA 1993a, 1993b, and 1993c). For these site types, or sites where remedial actions are anticipated, characterization and feasibility studies may be streamlined to result in early actions, i.e., implementation of either interim or final remedial actions including the use of presumptive remedies.

Three streamlining initiatives:

1. SACM.

Under SACM, presumptive remedies have been identified or are being considered for these site types: municipal landfills, wood treatment facilities, facilities with volatile organic compounds (VOCs) in groundwater, soil contaminated with VOCs, grain storage facilities, coal gasification plants, and sites contaminated with polychlorinated biphenyls (PCBS). Early actions are not limited to sites on the National Priorities List (NPL). EPA has been emphasizing the use of removal authority under CERCLA Section 104 to require potentially responsible parties to perform early actions even before the sites are listed on the NPL.

2. RCRA stabilization.

For hazardous waste treatment, storage and disposal facilities undergoing RCRA corrective action, EPA is also encouraging the facility owner/operator to conduct focused site characterizations and implement interim measures early in the site investigative phase. Early actions or interim measures are selective in nature, i.e., they are selectively applied to presumptive remedy “candidate” sites and/or high priority sites or SWMUs which pose the most serious site risk or represent the principal threat posed by the facility.

3. **SAFER.**

DOE has developed the Streamlined Approach for Environmental Restoration (SAFER)(DOE 1993), which provides explicit recognition and management of uncertainty, and early selection or decision on the need for remedy or corrective measure. Under SAFER, data quality objectives (DQOs) are used to collect the appropriate data to support a site decision. As the remedial project progresses, previously and newly collected data are continuously being evaluated for uncertainty and adequacy to support making site decision or additional information needs. Implementation of SAFER streamlines the traditional site characterization approach, and allows early implementation of the remedy to address probable site conditions and monitoring of remedy performance to meet remedial action objectives (RAOs).

What are the objectives of an early action? CERCLA and RCRA response actions are driven by the protection of human health andtheenvironment (Figure 1). When a response action is determined to be necessary, early actions can provide a substantial risk reduction. Early actions are implemented with the following primary objectives: Rapid reduction of risks; Control of current or future release and migration of contaminants; Consistency of early action with the anticipated final remedy; Cost and time savings related to site characterization; Early return of the contaminated property to current or reasonably anticipated future uses; and Compliance with regulatory requirements and/or community's concern to result in stakeholders' acceptance. Early actions provide the opportunity for the environmental project team members and the stakeholders to have an early agreement on the likely final remedies or anticipated site options. Therefore, the uncertainty with respect to site closeout or permit compliance is likely to be minimized through communications and consensus building among all parties in deciding the need for and/or types of early actions to be conducted.	**The importance of consensus.**
What are examples of early actions or interim measures, and how do they streamline site characterization? An early action can be taken to prevent the release and migration of contaminants. The following examples on early action illustrate the need for a streamlined site characterization approach which could also satisfy risk assessment data needs.	
Example: To prevent release and migration of hazardous wastes or constituents from an uncontrolled landfill, a cover or cap of low permeability and run-on diversion would reduce water infiltration into the wastes and the potential for contaminant leaching from the waste into groundwater (perched groundwater). A leachate collection/removal system would prevent or substantially reduce migration of contaminants away from the landfill, mitigating potential off-site threats to human health and the environment. The site characterization can be streamlined to support early actions by defining the boundary of the cap, locating on-site borrow areas of clean soils for use as capping materials, and establishing the direction of jlow of the contaminated perched groundwater or leachate for the placement of an interceptor trench, e.g., French Drain. These data allow the risk assessor to	**Exposure pathway analysis is a viable approach.** **No pathway = no risk.**

evaluate if all potential releases are controlled and the exposure pathways are incomplete.

An early action can be taken to prevent direct exposures that may pose a public health concern.

Eample: For waste piles and highly contaminated soils, actions such as waste removal and placement of a temporary cap and fencing may be taken to prevent direct exposure by humans or ecological receptors. Implementation of these actions would reduce the opportunity for exposure, therefore significantly mitigating the acute (short-term) risks. The site characterization could be streamlined by eliminating the need for extensive characterization of known areas with high contamination ("hot spots"). Resources can be selectively applied to characterize moderate to low contamination areas in order to provide the chemical data for hazard assessment and for comparison with PRGs to determine the need for remediation/corrective measure.

Comparison to other standards.

What kind of risk assessment or risk analysis is relevant to streamlined site characterization to facilitate early actions?

Purpose of an SRE.

Streamlined Risk Evaluation (SRE) may be used to identify whether early actions or interim measures are warranted for an individual site or SWMU. The SRE is primarily qualitative, and is used to:

- Evaluate whether a site or SWMU poses a substantial (principal) threat to human health and the environment or, if appropriate,
- Prioritize sites or SWMUs as candidates for early actions.

Four approaches:

1. Comparison to external standards.

Comparison of contaminant concentration levels with available risk-based and chemical-specific standards, e.g., applicable or relevant and appropriate requirements (ARARs) under CERCLA, is considered to be an SRE.

Other example SREs and their specific applications are:

2. Pathway analysis.

A Site Conceptual Exposure Model (SCEM) is used to determine if a source of contamination could pose a substantial threat to human health and the environment because the exposure pathways are complete. A SCEM is developed based on a review of relevant site or SWMU-specific information which may include human activity patterns or usage of the contaminated media, topographic, geologic, hydrogeological and meteorological studies in the site area.

3. Comparisons to site-specific standards.

Risk-based action levels or preliminary remediation goals (PRGs) are used to determine if the source(s) of contamination is (are) of concern (hazard evaluation) based on a comparison of contaminant concentrations (if available) with the risk-based action levels or PRGs.

Qualitative or semi-quantitative analysis of alternatives is used to help select an early action/interim measure or a combination of actions or different approaches to the presumptive remedy (e.g., landfill cap designs). The analysis determines the risk reduction capabilities of each approach or alternatives examined.	**4. Evaluation of alternatives.**
Any combination of the above may be used to evaluate if further remedial actions are needed for a site or SWMU after implementation of an early action or interim measure.	**Combinations of approaches.**
Although not explicitly identified in the SACM guidance, a quantitative SRE (screening risk assessment) may be conducted, based on default exposure assumptions, for the current or reasonably anticipated future land use (whichever is more conservative) and the most sensitive receptor. The above SRE procedure in reverse can be used to derive PRGs for the site for comparison with site data if published PRGs are not available for the contaminants.	
What types of data are required for the SRE?	
In order for a streamlined risk assessment to integrate information on hazard (toxicity) and exposure (intake), the data requirements are:	**Data needs.**
• Hazard – Data that provide information about the identity and concentration of contaminants, as well as historical information concerning spills, releases or hazardous substances or wastes treated, stored or disposed on-site.	
• Exposure –Data that support the existence of complete exposure pathways. Examples would include the following: well surveys (number and depths of well); site or regional hydrology, geology and hydrogeology; meteorological data (wind speed and direction, precipitation types and rates, etc.); and distances from the site to potential human and ecological receptors and sensitive environments.	
• Incident Report or Health Advisory (optional supporting data) –Injury or damage report of humans, domestic animals and other biological species; health assessment or well designed epidemiological studies based on definitive data or data highly suggestive of a cause-effect relationship; and local or state fish/game advisories.	
What are the data quality and quantity requirements for the SRE?	
Since most SREs are performed early, the data available to perform the evaluation may be limited. The SRE should be completed quickly to allow timely input into the early action decision. Therefore, the SRE is generally performed with a minimum amount of data or selected data that represent the worst case, based on a current understanding of the site.	

Whenever a sampling plan is limited in scope, as in streamlined site investigations, the sampling strategy should be biased toward locations where contaminants are likely to be found and where there is potential for exposure to humans or ecological receptors. For example, sampling should focus on the immediate area of a spill as visually identified by stressed vegetation, staining or aerial photographs.	
The desire to do quick, inexpensive, conservative sampling should be balanced with the costs of grossly overestimating risks and overestimating the requirements of the remedy. Therefore, the appropriateness and the uncertainty associated with the use of limited data to represent site risk in the SRE should be clearly explained to the decision-makers.	
For a controlled landfill with an existing cover and leachate collection system, leachate recovery wells which capture contaminants from a broad area are the preferred sampling locations. This is a more effective use of project resources than sampling the "worst case" locations, (i.e., wells with highest concentrations in limited sampling rounds). Similarly, the soil samples may be systematically collected at the existing cover within the defined cap boundary. The selection of sampling locations may also be based on subsurface field screening techniques, such as soil gas probe, groundwater probe, and organic vapor analyzer.	
The data from a streamlined site characterization study should, at a minimum, meet the requirements of QA2 (QA2 is a verification objective which requires a minimum of 10 percent verification of chemical identity (by an analyte-specific method) of the field or laboratory results, and a minimum of 10 percent verification of quantitation (accuracy of measured concentration)). QA3 may be required per EPA's "Quality *Assurance/Quality Control Guidance for Removal Activities: Sampling QA/QC Plan and Data Validation Procedures",* Office of Emergency and Remedial Response, April 1990, if a quantitative SRE is anticipated. QA3 assesses the analytical error of the concentration level as well the chemical identity by using vigorous analytical methods and quality assurance.	**If new data are to be collected, higher quality can be specified. Available information may not be at this level. See Submodule 1.1, Note C for a different approach.**
Background data are highly desirable if available. To determine if the detected contaminant is site related or related to SWMUs/AOCs under consideration, either the maximum detected or the mean contaminant concentration (if 3 or more data points are available, preferably 8 to 10 samples as a rule of thumb) is compared with background concentrations. This should be performed for metals and any anthropogenic compounds (e.g., polycyclic aromatic hydrocarbons) of concern. If background data are not available, the site data should be compared with literature values (e.g., *"Element Concentrations in Soils, Conterrninous United States"*, U.S. Geologic Survey Professional Paper 1270 by HT Shacklette and JG Boemgen, 1984)	**Use of background data.**

How does project planning help meet the SRE data needs?

ERPM's responsibilities.

Given an understanding of other stakeholders' concerns or expectations, the environmental restoration program manager (ERPM) should identify the goals and objectives (relating to early actions and streamlined site characterization approach) for the project team members (including the risk assessor). Based on the ERPM's goals and objectives, the risk assessor can identify the features or types of deliverables and the level of effort associated with the SRE.

By interacting with other project team members (geologist, hydrogeologist, design engineer, chemist, air quality specialist, etc.), a defensible SCEM can be developed by the risk assessor to identify data types, sample locations, and sampling strategy/design for the SRE.

The importance of scoping.

Clarification of the project objectives in the scoping or project planning phase of a streamlined site characterization study will help focus the SRE data needs. The project objectives relating to presumptive remedy or early action implementation may include:

- Site prioritization for early action;
- Determining if the proposed early action is warranted or is able to substantially reduce risk for a specific site or SWMU;
- Justification of action in Engineering Evaluation/Cost Analysis (EE/CA); and
- The potential short-term risk associated with the early action and the proposed control measures, etc,

Data quality requirements may be driven in part by future uses of the data.

After completion of a removal action or interim measure, an expanded or more quantitative SRE can be performed (in lieu of a baseline risk assessment, if necessary) to determine the residual risk for any complete exposure pathways and the need for further remedial action. To integrate data between project phases properly, the data collection option and QA/QC requirements for the SRE should be consistent with those needed for the remedial investigation or RCRA facility investigation project phase. To facilitate the data integration, QA3 or higher data quality assurance will be required.

Note E. **Example Strategy Memorandum Outline (target 10 pages or less).**

1. Brief summary/description of operable unit (from existing documents)

   Physical description
   b. Ongoing RI/FS, if any
   c. Discussion about early actions allowed under FFS

2. List of problems within operable unit, with a brief description of each and references to other sources of more detailed descriptions

   Site Problem 1
   a. Site Problem 2
   .
   .
   .

3. Description of phased response strategy

   General description of the phased response strategy and its scope
   b. Site problems that can be addressed by early actions
   c. Types of actions (e.g., emergency, non-time-critical, early) that will be used
   d. Site problems deferred to final action

4. Diagram or table showing the use of early and final actions in the phased response

5. Strategic objectives and overall approach for each selected action

6. Summary understanding of extended project team about how the phased response strategy will be implemented

   Discussion of advantages of the phased response strategy
   b. Major issues and their resolution (or interim assumed resolution) to facilitate the phased response, for example

      1. Waste disposal
      2. Land use
      3. Exposure scenario
      4. ARARs
      5. Corrective Action Management Unit (CAMU)

7. Schedule

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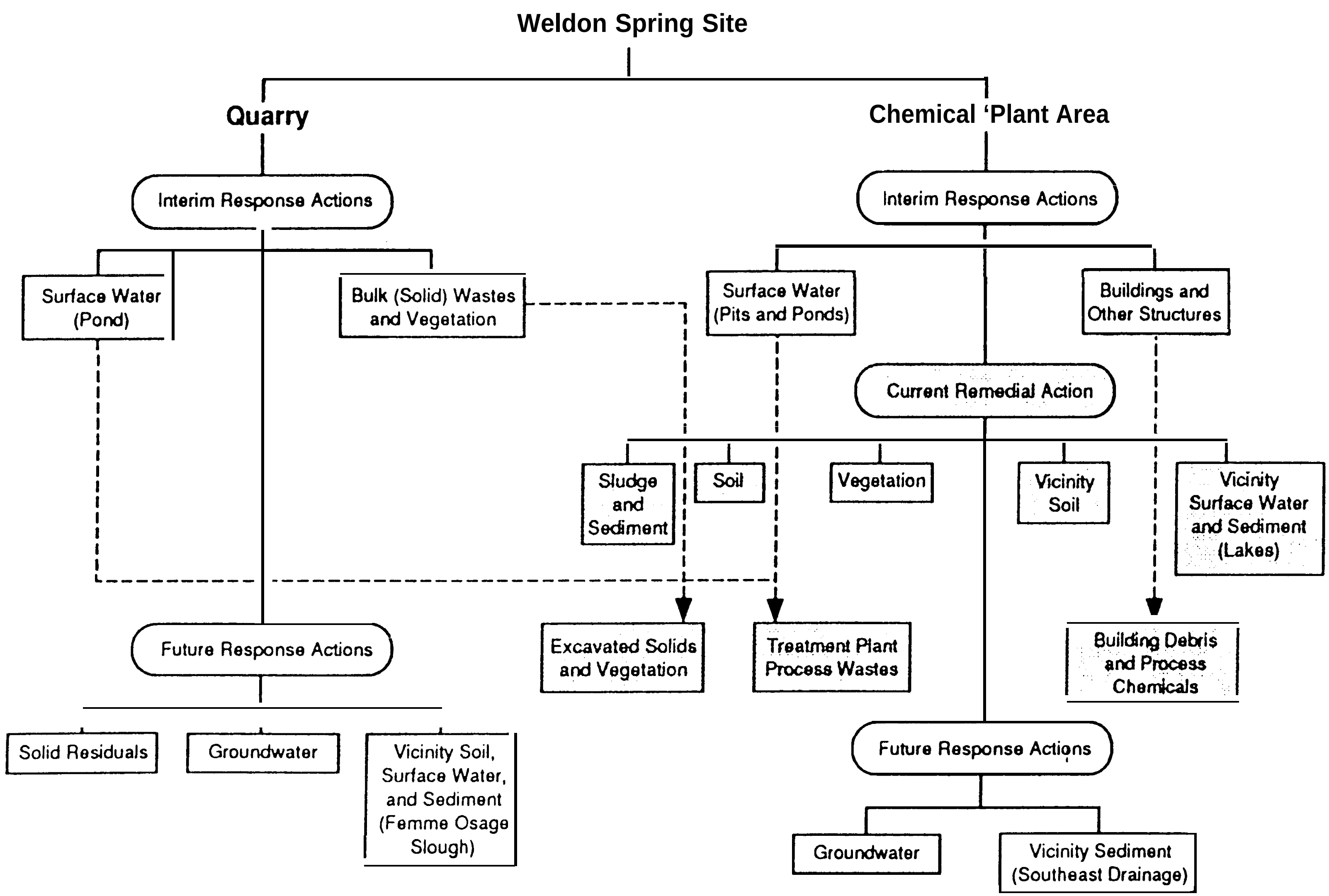
Note F. **Example Phased Response Strategy: Weldon Spring Site Remedial Action Project.**

This example of a phased response strategy is from the Weldon Spring site in Missouri. It is taken from the FS for the main operations area, known as the Chemical Plant Area. The strategy being implemented at the site relies on extensive use of early actions to achieve risk reductions years before final RODS will be possible. Because most of the early actions had been or were being implemented when this was written (in late 1992), much of the strategy is retrospective in nature. Typically, a phased response strategy would be prospective. Nevertheless, this is an excellent example of using all of the CERCLA tools to clean up a site more quickly and efficiently than is possible when every problem proceeds through a comprehensive RI/FS.

Main text	Margin notes
1.5 Scope of Site Environmental Activities and Documentation	
Cleanup of the Weldon Spring site consists of several integrated components, which are shown together with the affected media in Figure 1.7. An overview of the relationship between environmental compliance activities and documents for the project is presented in Figure 1.8. This FS is one of the primary evaluation documents of the RI/FS-EIS for the current remedial action at the chemical plant area. The scope of this action encompasses all media except groundwater and includes vicinity properties related to the chemical plant area except the Southeast Drainage. Additional documents will be prepared within the next several years to support decisions for both groundwater and the Southeast Drainage.	Scope of specific action and role in overall phased strategy.
The RI/FS-EIS also addresses comprehensive disposal decisions for the project, including the disposition of contaminated material generated as a result of previous response actions and material that might be generated by upcoming response actions. The scope of this FS in relation to the chemical plant area component of site remediation is discussed in Section 1.5.2.	Discussion of actions taken and planned that constitute the phased approach strategy.
A number of interim actions have already been documented to address other components of the site remediation process, including the first and second stage of quarry cleanup (i.e., the surface water and bulk waste components). These actions and related documents are described in Section 1.5.1. Additional documents will be prepared within the next several years to address the remaining quarry components (i.e., residual solid material; vicinity soil, sediment, and surface water; and groundwater). Those actions and related documents are discussed in Section 1.5.3.	
All interim actions for the project, both expedited response (removal) actions and interim remedial actions, have been performed in accordance with CERCLA requirements and within the constraints of CEQ regulations for NEPA for interim actions while an EIS is in preparation (Title 40, Code of Federal Regulations, Part 1506.1 [40 CFR 1506. l]). That is, the interim actions have been justified independently, have been accompanied by adequate environmental documentation, and have not prejudiced the ultimate decision for which the RI/FS-EIS is being prepared (e.g., by limiting the choice of reasonable alternatives). The interim actions have not addressed decisions on remediating the entire chemical plant area or comprehensive waste disposal. Contaminated material generated by the interim actions is being placed in short-term storage at the chemical plant area, pending the final waste disposal decision for the project. This decision will be based on the information and analyses presented in the RI/FS-EIS.	Regulatory basis and authority for action. Integration and scope of removal actions, early remedial actions, and final remedial actions.
1.5.1 Previous Response Actions	
Various interim actions have been identified for the project to mitigate actual or potential releases of radioactive or chemical contaminants into the environment. A number of small-scope expedited response actions	Previous interim actions.



Note: The boxes represent contaminated media *addressed by the project's cleanup actions for the chemical plant area and the quarry, and they are connected by solid lines to the appropriate phase of site cleanup. Dashed lines identify waste stored at the chemical plant area as a result of the interim actions. The media for which specific treatment and dlsposal) decisions will be made as part of the current remedial action are indicated led by shading.*

FIGURE 1.7 Components of Site Remediation (Note that the disposition of contaminated material from future response actions is addressed in the current remedial action.)

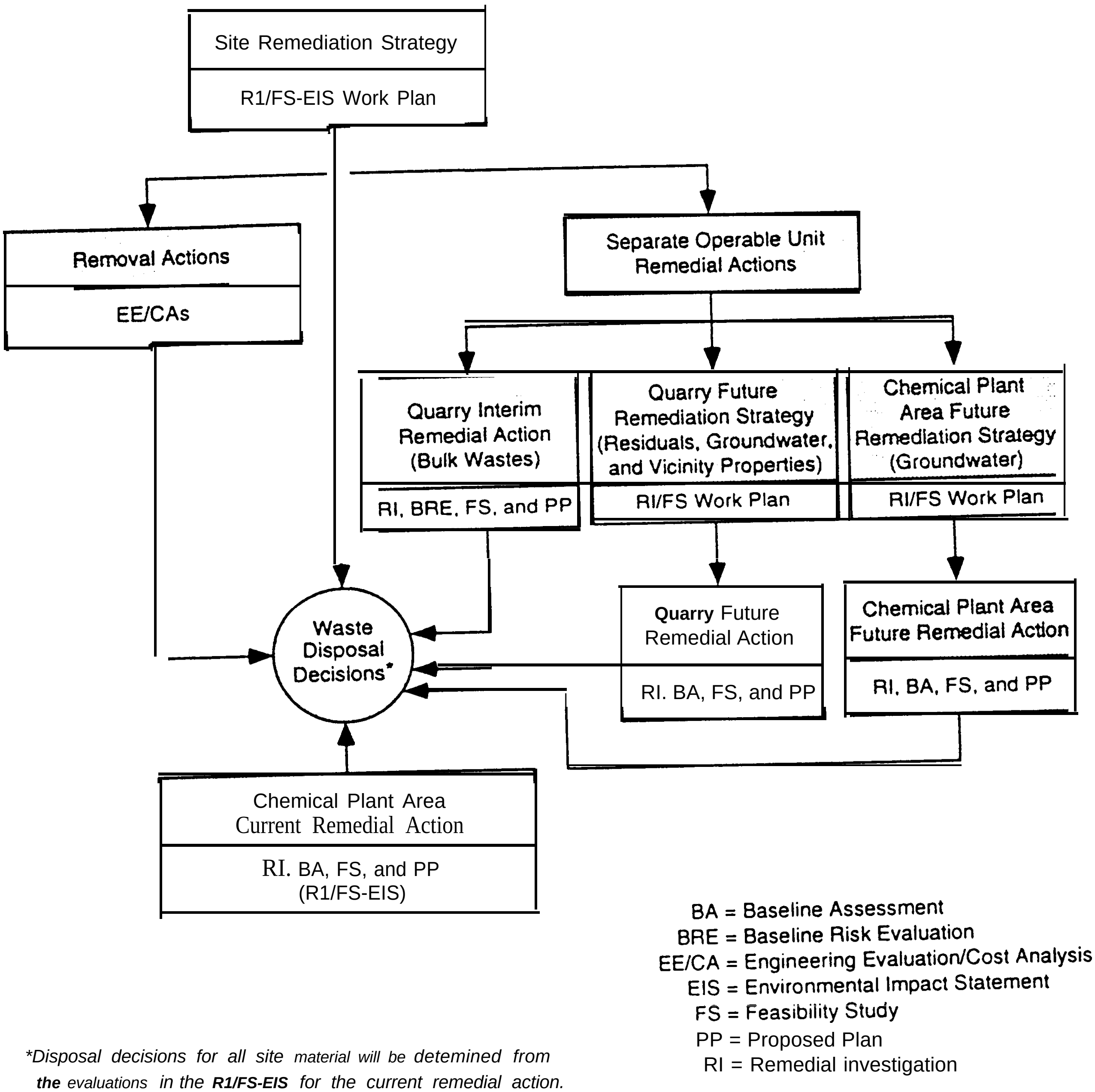


FIGURE 1.8 Major Environmental Compliance Activities and Related Documents for the Weldon Spring Site Remedial Action Project

have been documented in focused engineering evaluation/cost analysis (EE/CA) reports. As discussed below, some of these CERCLA reports have been supplemented to incorporate NEPA values and to serve as environmental assessment (EA) reports under NEPA; in other cases, a memorandum-to-file was appropriate as the NEPA review for the proposed action (this was a level of NEPA review that was discontinued by DOE on September 30, 1990).

1.5.1.1 Expedited Actions at the Chemical Plant Area

Previous removal actions and list of site problems addressed as non-time-critical removal actions.

Expedited actions at the chemical plant area were defined to mitigate health and safety threats to on-site persomel and/or to respond to off-site contaminant releases. Pursuant to the integrated EE/CA process, which included a public review and comment period, the following actions have been implemented:

- Inactive power lines and poles that were falling to the ground have been taken down. Uncontaminated material has been released off-site for reuse, and contaminated material has been placed in the debris staging area of the MSA.

- Overhead external piping insulated with deteriorating asbestos coverings has been taken down. The asbestos coverings have been removed, and all material has been surveyed and classified. Most of the piping has been released off-site for reuse; the remainder has been placed in the debris staging area of the MSA. The asbestos has been bagged and placed in bin containers for short-term storage in the northeastern portion of the site (Figure 1.3).

- Polychlorinated biphenyls (PCBs) have been flushed from electrical equipment. Items contaminated with PCBs only have been transported off-site to a permitted treatment and disposal facility; PCB-contaminated items that are also radioactively contaminated are stored on-site within an empty nonprocess building that was recently converted for waste storage (Building 434).

- Chemicals from various buildings have been (and continue to be) containerized and consolidated in Building 434.

- A small amount of radioactively contaminated soil from a vicinity property on the adjacent Army Reserve area has been excavated, drummed, and placed in controlled storage in Building 434.

- A dike and diversion system has been constructed at Ash Pond to direct surface runoff around a contaminated area (the South Dump) in order to reduce contaminant releases (principally uranium) off-site via surface drainage from the northern site boundary.

- Several nonprocess buildings have been dismantled (including the former administration building and steam plant), and the resultant contaminated material has been placed in the debris staging area of the MSA.

More extensive interim actions have also been documented for the project (Figure 1.7), but these actions are in the detailed design and site preparation stage and have not yet been fully implemented. Two such actions, management of contaminated pond water and management of the bulk (solid) waste, address quarry components of site remediation (see Sections 1.5.1.2 and 1.5.1.3).

1.5.1.2 Management of Quarry Pond Water

Site problem addressed as non-time-critical removal action.

Management of contaminated surface water in the quarry was proposed as an expedited response action to mitigate the potential threat to a nearby drinking water supply, i.e., the county well field located within 1.6 km (1 mi) of the quarry (Figure 1.2). Monitoring results have indicated that contaminants are migrating from the quarry pond into the local groundwater and moving in the direction of the well field. The quarry pond is contaminated as a result of contact with the solid wastes that were placed in the quarry more than 20 years ago. This pond provides a gradient for contaminant migration because the pond surface is higher than the nearby groundwater table. An EE/CA, written to incorporate NEPA values appropriate for an EA, was prepared to support this action (MacDonnell et al. 1989).

The alternative selected pursuant to the integrated EE/CA process, which included public review and comment, was to treat the pond water in a facility constructed adjacent to the quarry and release the treated water to the Missouri River in compliance with a permit issued to DOE by the Missouri Department of Natural Resources. A responsiveness summary was prepared to respond to public comments on the EE/CA, and the documents were adopted as an EA under NEPA. A finding of no significant impact (FONSI) was issued in February 1990. The water treatment plant has recently become operational and is expected to treat water during the quarry remedial action period, e.g., for 8 to 10 years. The treatment plant process waste will be containerized for transport to the TSA, as described for the quarry bulk waste. In addition to mitigating a potential threat to human health and the environment at the quarry, this action supports the second component of quarry cleanup, i.e., management of the bulk waste.

1.5.1.3 Management of Quarry Bulk Waste Management of the bulk (solid) waste was proposed as an interim remedial action to mitigate the potential threat associated with that waste, which is the source of contaminants migrating into the air and the underlying groundwater at the quarry. A focused RI/FS package was prepared to support the action and was written to incorporate NEPA values appropriate for an EA. This document package consisted of (1) an RI, which presented characterization information for the quarry and the waste therein (DOE 1989); (2) a baseline risk evaluation, which assessed potential exposures to this waste in the short term under current conditions (DOE 1990a); (3) an FS, which developed, screened, and evaluated potential alternatives for managing the bulk waste (DOE 1990b); and (4) a PP, which summarized key information from the other primary documents (DOE 1990c). The alternative selected pursuant to the integrated RI/FS process, which included public review and comment, was to excavate the bulk waste from the quarry and transport it to the chemical plant area of the Weldon Spring site for short-term storage, pending the disposal decision that will be determined from the current RI/FS-EIS. Removal of the quarry pond water will facilitate the excavation of this waste. Following excavation, the waste is to be placed in controlled storage in an engineered facility (termed the TSA) constructed adjacent to the raffinate pits. The TSA includes an equipment decontamination pad and contains a retention pond to collect water such as precipitation runoff and any leachate generated during the projected 3- to 6-year storage period. Also included in this action was the decontamination and dismantlement of four buildings in the area targeted for the TSA and the construction of an MSA debris staging area for short-term storage of this material (and other debris from similar actions [Section 1.5.1. l]), pending the upcoming disposal decision. A responsiveness summary was prepared to respond to public comments on the quarry RI/FS, and a ROD prepared in accordance with the CERCLA decision process was signed by EPA in September 1990 and issued by DOE in March 1991. (The NEPA review process for this action was addressed together with a related response action for surface water at the chemical plant area, as discussed in Section 1.5.1 .4.) Waste excavation is expected to be initiated in 1993 and to continue for 2 to 3 years.	**Site problem addressed as early removal action. Technical basis for action.**
1.5.1.4 Management of Water Impounded at the Chemical Plant Area An additional expedited response action for the project, management of contaminated water impounded at the chemical plant area, was proposed to mitigate the potential threat associated with ecological exposures and contaminant releases to on-site groundwater and off-site surface water. An EE/CA, written to incorporate NEPA values appropriate for an EA, was prepared to support this action (McDonnell et al. 1990). The alternative selected pursuant to the integrated EE/CA process, which included public review and comment, was to treat the impounded water in a facility	**Technical basis for action.**

constructed adjacent to the raffinate pits and release the treated water to the Missouri River in compliance with a permit issued to DOE by the Missouri Department of Natural Resources. The treatment plant process waste will be containerized and placed in short-term storage at the TSA, pending the upcoming disposal decision. Also included in this action was the decontamination and dismantlement of three structures in the area targeted for treatment plant construction, with short-term storage of debris in the staging area at the MSA. This water treatment action supports the quarry bulk waste action because the plant would be available to treat water collected in the TSA retention pond.

A responsiveness summary was prepared to respond to public comments on the EE/CA, and a removal action decision document was prepared to support the CERCLA decision process. The integrated RI/FS for the bulk waste interim action and the EE/CA for this water treatment plant were jointly adopted as an EA under NEPA, and a FONSI was issued in November 1990.

The original discharge plan for the water treatment plant, which was to release the effluent to the Southeast Drainage for gravity flow to the Missouri River, was subsequently modified during detailed design of the treatment system. As part of the design effort, flows in the drainage were studied to assess the potential for contaminant resuspension at the expected discharge rates. Clean water was released from a hydrant at the upper end of the channel and then sampled for uranium at several locations downstream. Results indicated that uranium in the sediment from past releases (e.g., from decanting the raffinate pit water) could be resuspended at levels comparable to those naturally occurring in the Southeast Drainage after rainfall or snowmelt. To limit the potential for this resuspension, the design was changed such that treated water would be released through a buried 15-cm (6-in.) pipe similar to that designed for the quarry water treatment plant. The route determined for this pipeline follows the haul road recently constructed for transporting the bulk waste from the quarry to the chemical plant area, then parallels an abandoned railroad embankment and turns to follow a dirt road toward the Missouri River, with discharge through a submerged outfall.

A separate NEPA review (categorical exclusion) was conducted to address this design modification, and a floodplain/wetlands assessment was published in the *Federal Register* on September 15, 1992. The treatment plant and pipeline are expected to be completed soon and the facility is expected to be operational in early 1993. It would continue to treat water at the chemical plant area during the remedial action period, e.g., for 8 to 10 years.

1.5.1.5 Management of Chemical Plant Structures

A further interim action for the chemical plant area, management of 15 nonprocess buildings, was documented as an expedited response action to mitigate potential health and safety threats to on-site personnel. This action

Technical basis for non-time-critical removal action.

also addressed the potential threats associated with contaminant releases off-site. The chemical plant buildings have been inactive for more than 20 years and are in varying stages of disrepair; the roofs of some of these buildings have deteriorated to the extent that rainfall enters during storms, resulting in potential contaminant resuspension and transport off-site via water that enters the old process sewers.

An EE/CA and addendum, written to incorporate NEPA values appropriate for an EA, were prepared to support this action (McDonnell and Peterson 1989, 1990). The alternative selected pursuant to the EE/CA process, which included public review (no formal comments were received), was to decontaminate and dismantle the buildings and place the material in controlled storage within the MSA, pending the upcoming disposal decision; uncontaminated salvageable material such as structural steel could be released off-site for reuse.

A similar interim action to decontaminate and dismantle the remaining chemical plant structures was subsequently documented as an expedited response action, to mitigate similar threats. An EE/CA, written to incorporate NEPA values appropriate for an EA, was also prepared to support this action (Peterson and McDonnell 1991). The alternative selected pursuant to the EE/CA process, which included public review (no formal comments were received), was the same as that selected for the 15 nonprocess buildings. A removal action decision document was prepared for the CERCLA decision process. The two EE/CAs and the addendum were jointly adopted as an EA under NEPA, and a FONSI was issued in October 1991.

1.5.2 Currently **Proposed Response Action**

Scope of final action.

Two basic components of the chemical plant area are addressed in this FS:

- Assessment of the appropriate response for contaminated soil, sludge, sediment, and vegetation; and

- Assessment of the appropriate response for vicinity properties associated with the chemical plant area, except the Southeast Drainage; these vicinity properties include localized areas of contaminated soil and water, sediment, and shoreline soil at lakes in the Busch Wildlife Area.

This RI/FS-EIS also addresses the disposition of material resulting from previous interim actions (Section 1.5. 1), including:

- Bulk waste excavated from the quarry and stored at the TSA;

• Demolition debris, equipment, tanks, and other material resulting from the decontamination and dismantlement of site structures (referred to as structural material in this FS) and stored at the MSA debris staging area; • Chemicals stored in Building 434; • Asbestos removed from piping and structures and stored in the staging area in the northern portion of the site; and • Containerized process wastes generated by water treatment plants at both the quarry and the chemical plant area and stored at the TSA. Future leanup decisions for the quarry are not included in the scope of the current remedial action for the chemical plant area; these will be addressed in documentation to be prepared within the next several years, as will the decisions for the Southeast Drainage and groundwater (see Figures 1.7 and 1.8 and Section 1.5 .3). However, contaminated material that could be generated as a result of future activities is expected to be similar to that addressed by the current action. Hence, the disposition of that material is included in this RI/FS/EIS process for planning purposes to ensure a comprehensive disposal decision for the project. The BA (DOE 1992a) addresses conditions as they existed at the site in early 1992, irrespective of interim responses for which decisions had already been made but had not yet been fully implemented. In contrast, the updated conditions for this FS reflect the configuration of the site as it will soon exist as the result of those interim actions. That is, although the bulk waste is still in the quarry, this waste was assumed to be in storage at the TSA for the analyses in this document. In addition, although many buildings and underground tanks are still in place at the chemical plant area, contaminated material resulting from their decontamination and dismantlement was assumed to be in storage at the debris staging area of the MSA. Finally, although surface water is still present in the quarry pond and in the pits and ponds at the chemical plant area, it was assumed that the water treatment plants are operating at both locations. The locations of the TSA and MSA, including the debris staging area, are shown in Figure 1.3. The volume of material at the TSA is expected to total about 115,000 m^3 (150,000 yd^3), and the volume of material at the debris staging area is estimated to total about 73,000 m^3 (95,000 yd^3); the latter will consist of contaminated material generated from building dismantlement. In addition, up to 168,000 m^3 (220,000 yd^3) of contaminated soil and rubble generated by cleanup and support activities (e.g., for construction of the water treatment plant and TSA) would be staged in the MSA soil staging area, as needed, over the remedial action period. The materials assumed to be stored at the TSA and MSA are summarized in Table 1.1 and are also described in the RI report for the quarry bulk waste	**Expected conditions.**

(DOE 1989) and the design criteria report for the MSA (MK-Ferguson Company and Jacobs Engineering Group 1990).

The locations of the water treatment plants are shown in Figures 1.2 and 1.3. me annual average volume of process wastes generated by water treatment is not expected to exceed about 30 m^3 (50 yd^3) for the quarry system and about 70 m^3 (90 yd^3) and 290 m^3 (380 yd^3) for the physicochermical and distillation process trains, respectively, of the chemical plant area system. The types of process wastes that would be generated are described in the respective EE/CA reports (McDonnell et al. 1989, 1990). Volume estimates for the contaminated media at the site are summarized in Section 2.1.

1.5.3 Future Response Actions

Relationship of this action to future actions.

Additional response actions are proposed for the project to address the last two components of the chemical plant area remediation – the Southeast Drainage and groundwater. Further actions are also proposed to address the final stage of quarry remediation, i.e., to manage residual material at the quarry area following bulk waste removal.

The response for the Southeast Drainage has been separated from the current response action in part because conditions in the drainage will change as a result of the upcoming decision for the chemical plant area. For example, water quality will improve because cleanup activities on-site are expected to reduce contaminant transport in surface runoff down the drainage, which would also limit potential deposition of suspended solids. Also, further sampling is needed to fully characterize the drainage so more representative impacts can be assessed. Therefore, the Southeast Drainage will be addressed as a removal action within the next several years, and an EE/CA will be prepared to support related decisions.

The groundwater response action has been separated from the current response action because the comprehensive data needed to support a final decision are not currently available. This approach will also permit coordination with the Army, which is responsible for the adjacent NPL site at which groundwater is also contaminated (Section 1.3.1). Therefore, groundwater remediation is being addressed as a separate operable unit remedial action. Over the next several years, an RI/FS work plan will be prepared to describe the scope of this action, and an RI, BA, FS, and PP will be prepared to support related decisions.

List of site problems to be addrssed in future actions.

me scope of the follow-on actions for the quarry will also be defined in an RI/FS work plan that will be prepared within the next year to support the final decision-making process for this area (Figure 1.8). This follow-on effort will assess the appropriate response for (1) residual solid materials in the cracks and crevices of the quarry, (2) groundwater at the quarry, and (3) contaminated media at quarry vicinity properties, which include surface water and sediment in Femme Osage Slough and nearby areas of contaminated soil. After the bulk waste has been excavated from the quarry, the quarry walls, floor, and subsurface will be characterized. Additional data will be evaluated in a BA for the final quarry response. Alternatives for the permanent disposition of the quarry area will be developed and evaluated in an FS, and a PP will be prepared to propose the final response.

As for the other documents, these future documents will incorporate NEPA values whenever practicable, and they will be issued to the public for comment. The types and volumes of contaminated material that could be generated as a result of upcoming activities have been conservatively estimated in this FS for planning purposes to support comprehensive project decisions. These volumes and those estimated for other contaminated media are presented in Section 2.1.

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Submodule 1.2 Development of a Consensus Memorandum

Phased Response Strategy

1.1 Development of a Phased Response Strategy

Development of a Consensus Memorandum

1.2 Development of a Consensus Memorandum

- **Developing Consensus of Extended Project Team**
- **Documenting the Consensus**

Submodule 1.2 Development of a Consensus Memorandum

Background

A consensus memorandum documents the need for and intent to undertake a specific early action for a particular site problem and initiates the decision and design support phase.

A consensus memorandum should contain the following elements:

- A brief summary (less than 1 page) of the phased response strategy for the specific OU, the OU background, and problems that exist
- A listing of objectives for the early action
- A paragraph on the specific site problem being addressed by the consensus memorandum, the type of early action, and authority
- A statement of consistency with the final remedy
- A statement of consensus from the extended project team
- A summary of the technical basis and overall approach
- A summary of major issues and assumptions
- A list and schedule of specific actions to complete design and decision support phase and, if appropriate, the early action

One consensus memorandum should be prepared, just prior to initiation, for each early action identified in the phased response strategy. It is short (less than 10 pages) and specific.

Organization

Submodule 1.2 discusses the following:

- Developing consensus of extended project team
- Documenting the consensus

In addition, more detailed information is provided in the following notes:

- Note A-Example Consensus Memorandum Outline
- Note B-Example Consensus Memorandum: Hanford 1OO-BC-1 Demonstration Project Agreement

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Sources

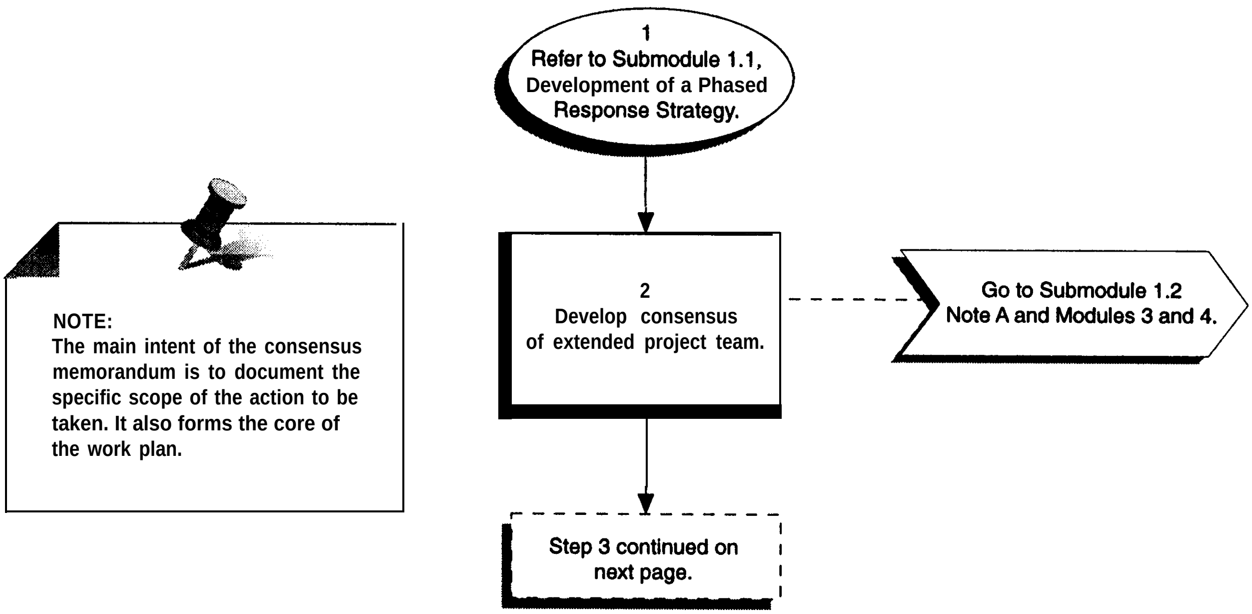
1. DOE, September 1994, CERCM *Removal Actions, DOE/EH-0435.*

2. U.S. EPA. *Guidance for Evaluating Technical Impracticability of Ground Water Remediation.* OSWER Directive 9234.2-24.

3. U.S. EPA. *Considerations in Ground-Water Remediation at Supsend Sites and RCRA Facilities.* OSWER Directive 9283.1-06.

4. 40 CFR300, March8, *1990, National Oil and Hazardous Substances Pollution Contingent Plan,* Federal Register, Vol. 55, No. 46 Rules and Regulations.

Submodule 1.2 Development of a Consensus Memorandum



Step 1. Refer to Submodule 1.1, Development of a Phased Response Strategy.

Step 2. **Develop consensus of extended project team.** To initiate an early action, the extended project team must reach consensus on three points:

- Agreement that action is required to address some release or threat of a release and agreement on the general nature of the action that will be required
- The technical basis for deciding that action will be necessary (including risk)
- Agreement on how to manage the technical/regulatory issues that will guide or constrain the action

These points must be addressed in the consensus memorandum.

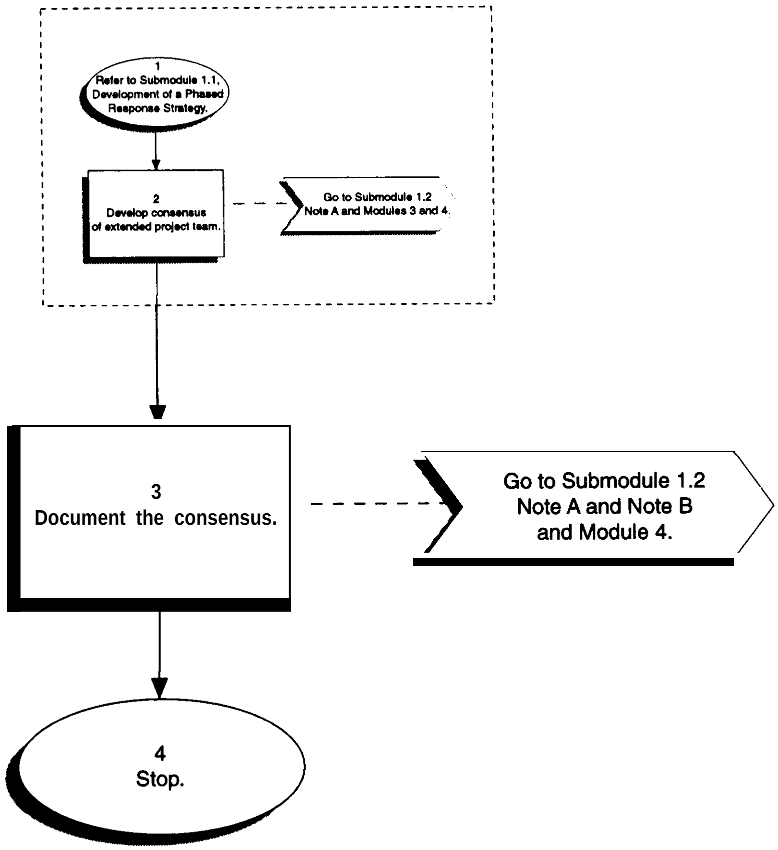
In the phased response strategy, (see Submodule 1.1) working assumptions were developed for all significant regulatory and other issues that can hinder or prevent early action. In the consensus memorandum, those same issues must be resolved in more detail. In this instance, the resolutions are not mere working assumptions, but represent resolution of the issues *for the purposes of the early action.* Final consensus must be reached on at least the following:

- Interims cleanup levels
- ARARs and waivers
- Use of innovative technologies
- Treatment, storage, and/or disposal of investigation-derived waste (IDW) and remediation waste
- Land use
- Use of institutional controls

The NCP requires early actions to be consistent with the final remedial actions. Therefore, a consensus memorandum should identify the following:

- Whether the early action will interfere with any future, full-scale remedial actions
- Where potential interferences might occur, the risks and how they can be avoided or mitigated
- The follow-up actions needed as part of the comprehensive RI/FS/RD/RA to prepare a final ROD
- Use of imovative technologies
- Disposition of remediation waste

Submodule 1.2 Development of a Consensus Memorandum (cont.)



- Land use
- Use of institutional controls

Submodule 1.2, Note A provides additional detail about the differences between the strategy memorandum and the consensus memorandum. Modules 3 and 4 provide additional detail on how these concepts are addressed during implementation.

Step 3. **Document the consensus.** A consensus memorandum should reflect the agreement of the extended project team to initiate the early action (i.e., the decision and design support phase). The consensus memorandum may serve the purpose of the work plan for a relatively simple site problem or form the core of a more detailed work plan for a more complex site problem. (See Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions.) The main focus of the consensus memorandum is to present the scope of the action to be undertaken. Submodule 1.2, Note A provides an example outline for a consensus memorandum; Note B provides an example consensus memorandum.

A consensus memorandum should reflect the agreement of the extended project team to initiate the early action. The consensus memorandum may serve the purpose of a work plan for a relatively simple site problem or form the core of a much more detailed work plan for a complex site problem (see Module 4, Non-Time-Critical Removal Actions and Early Remedial Actions).

An early action must contribute to the overall objectives of the comprehensive RI/FS. The NCP requires early actions to be consistent with the final remedial action. Therefore, a consensus memorandum should identify the following:

- Whether the early action will interfere with any future, full-scale remedial actions
- Where potential interferences might occur, the technical risks involved in undertaking the action, and how they can be avoided or mitigated
- The follow-up actions needed as part of the comprehensive RI/FS to prepare a final ROD.

Step4. Stop.

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Note A. **Example Consensus Memorandum Outline.**

I. Summary of OU phased response strategy, OU background, and specific problems addressed by the early action

II. Early action(s) identified and authority

III. Objectives of the early action(s) (more specific than they appeared in the phased response strategy)

IV. Statement of consistency with the final remedy

V. Statement of consensus from the extended project team

VI. Summary description of the technical basis and overall approach envisioned for the early action

1. Scope of action(s)
2. General response actions and technologies
3. Sequencing and schedule of action(s)
4, Disposition of waste(s) (treatment, storage, and disposal)
5. Operation and maintenance
6. Measures of success/completion
7, Closeout

VII. Major issues and assumptions

1. Rationale for action(s) (including risk)
2. Interim cleanup levels
3. ARARs and waivers
4. Use of innovative technologies
5. Management of waste(s)
6. Interim land use assumption for this action(s)
7. Use of institutional controls
8. Consistency of proposed early action with likely final ROD
9. Division of responsibilities (among extended project team)

VIII. List and schedule of specific actions necessary to complete early action

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Note B. **Example Consensus Memorandum: Hanford 1OO-BC-1 Demonstration Proiect Agreement.**

The following example consensus memorandum is for a removal action performed at Hanford as a precursor to an early remedial action and eventually a final action. As such it is an agreement to take action on a limited number of waste sites as part of a series of phased responses (i.e., removal, early remedial, final).

This example was not called a "consensus memorandum" during its development by DOE, EPA, and Washington State Department of Ecology; nor does it exactly follow the outline for a consensus memorandum (Submodule 1.2, Note A). However, this example illustrates how the intent of a consensus memorandum can be met in other formats. This agreement:

- Defined the scope of the action
- Described its interaction with the next phased response
- Provided strategic objectives of the three agencies
- Described the regulatory process that would be used to achieve the objectives
- Documented the agencies' consensus to take action
- Formed the core of the Removal Action Work Plan

The agreement was developed by the agencies, with DOE's contractor providing technical support over a series of four meetings of approximately 4 hours each.

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1OO-BC-1 Demonstration Project

1.2 Background

The Proposed Plan for the 1OO-BC OU is expected to be issued by June, 1995 with a record of decision to be signed by October, 1995. Continuous and substantive remedial activities are required within a 15 month period following the Record of Decision (ROD). Further, the Tri-Parties wish to initiate full-scale (i.e., concurrent remedial activities at multiple waste sites) within this 15 month time frame. A demonstration project is being conducted to 1) implement the preferred alternative defined in the proposed plan, and 2) reduce uncertainty prior to full scale remedial design and remedial action (RD/RA).

Scope

The 1OO-BC-1 Demonstration Project will implement the preferred alternative presented in the draft proposed plans on a limited basis (i.e., remove and dispose without treatment) and generate information to reduce Remedial Design and Remedial Action (RD/RA) uncertainties. The Demonstration Project will focus on a limited number of waste sites (e.g., 3 or 4). The waste sites will be addressed sequentially.

Treatment will not be included in the demonstration project, although the criteria to be used in determining when treatment is appropriate for both volume reduction and to meet LDRs may be developed. If LDR material is encountered, the ability to identify, and segregate soil contaminated with LDR substances (e.g.; mercury) will be evaluated as part of the demonstration project. Contaminated soil removed during the demonstration project may be stored (on or off site) until disposal can be arranged at a reasonable cost. Disposal of any contaminated soil stored during the demonstration project will be part of full scale remedial action,

Approach

The 1OO-BC-1 Demonstration Project will be conducted under CERCLA Section 104 authority as an non-time critical removal action. This removal action will be conducted concurrently and in cooperation with the 100 Area Remedial Action design process. The primary objective of the Demonstration Project will be remediation of 3 to 4 waste sites. Uncertainties that exist for full scale remedial design and remedial action (RD/RA) will be reduced through the collection of data during these activities.

An Engineering Evaluation and Cost Analysis (EE/CA) will be prepared and issued for public comment. After public comment an Action Memorandum will be issued as required by CERCLA

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Reasoning for a removal action being conducted as the first phase of a series of responses.

Difference between the removal action and early remedial action.

Waste management issues addressed.

Regulatory authority.

Tie to other responses.

Regulatory process.

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section 104. The EE/CA will incorporate the objectives and data needs developed by the extended project team and presented in this document.	
The 1OO-BC-1 Demonstration Project, and the 1OO-BC- 1 Remedial Design Plan are included in the scope of the Hanford SAFER Pilot Project, one of four SAFER pilot projects being conducted jointly by DOE and EPA at DOE facilities. The tenets of SAFER will be applied during the demonstration project and the remedial design.	
The scope, objectives, and data requirements for the Demonstration Project were developed through regulator participation in building extended project team consensus through the SAFER Pilot Project. The SAFER Tenets of managing uncertainty through the observational approach and developing data needs and decision rules through the Data Quality Objectives (DQO) process will be used during planning, design and implementation of the removal action.	
RD/RA Uncertainties	
The 1OO-BC-1 Demonstration Project is an implementation of the RD/RA system on a limited scale to achieve remediation. The Demonstration Project will also be used to reduce uncertainties in critical areas, and allow improvement during design and implementation of the full scale remedial action system. The extended project team developed a conceptual model of RD/RA and identified specific uncertainties for RD/RA. Data needs to reduce these uncertainties during the Demonstration Project were developed. It is generally recognized by the extended project team that the preferred alternative (i.e., remove, treat as appropriate, dispose) is robust. There is little uncertainty that contaminated soil can be excavated, treated to meet LDR requirements when required, and disposed. There is uncertainty in how the preferred alternative can be implemented most efficiently in terms of time, cost, and worker health and safety.	Explanation of why and how uncertainties are being addressed in overall project.
Specific uncertainties identified by the extended project team, include:	Consensus.
• Cultural Resources –Although general cultural and natural resources procedures are well-developed and understood, specific tasks and mitigation options remain for development with the Native American Tribes and the Hanford Trustees.	List of uncertainties to be addressed-note that they include technical (e.g., design issues) as well as regulatory (remediation standards) and procedural (e.g., acquisition strategy).

• **Numerical Remediation Standards** –Remediation standards will be derived from remediation goals in the ROD and will be the specific contaminant levels that must be met at an individual waste-site. The current drafts of the proposed plans require the use of balancing considerations to determine how deep to dig for protection of groundwater beyond the levels required to protect human health at the surface. The balancing considerations include cultural resource impacts, natural resource impacts, cost, foot print of the ERDF, and other considerations. The applicability of the balancing criteria, and protocol for using them have not been established.
 	
• Design – Protocol for coordination of remedial design with cultural and natural resource assessments and mitigation needs to be established. Contingency plans to address site specific uncertainties (including cultural resources) are also required. The integration of the various components of remedial action to achieve efficiency is required (e.g.; capacity, throughput).
 	
• Design of Remedial Action Subsystems –Subsystems include:
 	
    • Waste Management – Packaging and treatment requirements to meet disposal site WAC are undefined. Specific data requirements to meet WAC are undefined.
 	
    • Analytical System –The analytical system will be used to support decisions during remedial action. Decision areas requiring the support of the analytical system include 1) excavation, 2) waste management and disposal, 3) health and Safety, and 4) confirmation sampling. The type and amount of sampling to support these decisions will need to be developed. The analytical system must be integrated with the other components of the remedial action system to assure that sampling and analysis can support decisions without causing expensive delays in remediation. There are uncertainties in how integration of the analytical system will be achieved.
 	
    • Excavation –Excavation can be conducted using standard equipment. Optimization of the excavation system is the uncertainty.
 	
    • Treatment –Treatment will be used during full scale remedial action when appropriate or required	

for volume reduction, or when required to meet LDRs. Criteria and decision rules for determining when treatment is appropriate have not been developed. • **Material Handling –** Packaging of waste may be required for storage or disposal. Packaging systems could be purchased, or built to specifications. The ability to ship or package waste without delaying excavation will be required. The best way to accomplish this needs to be determined. • **Acquisition Strategy –** Subcontracting of the various components of remedial action may be desirable. Subcontracting approaches should be evaluated for the various subsystems (e.g.; excavation, analytical, packaging, transportation).	
Objectives	
Objectives for the 1OO-BC-1 Excavation Demonstration Project were developed through consensus of the extended project team. The objectives of the Demonstration Project are to:	**Consensus.**
1. Implement the preferred alternative as presented in the draft proposed plans on a limited basis (i.e.; remove and dispose, without treatment at 3 or 4 sites). The following tasks must be completed: • Develop remediation standards. This includes use of the balancing criteria as described in the proposed plan, and the development of stopping rules. • Achieve remediation standards. This includes implementation of the preferred alternative in a safe and timely manner.	**Main objective is to remediate 3 sites.**
2. While implementing the preferred alternative, collect information to reduce uncertainties prior to fill-scale remediation. These uncertainties include: • Specific tasks and mitigation options for cultural and natural resources. • Criteria (e.g., cost and effectiveness) for when treatment to achieve volume reduction is applicable.	**Secondary objective is to collect information during action to help with design and planning of next response.**

- Protocols for meeting LDR requirements if LDR waste is found.
- Applicability of balancing criteria and stopping rule.
- Ability (e.g.; effectiveness, timeliness etc.) to use the analytic system to identify the clean/dirty boundary, and to guide excavation.
- Ability to use the analytic system to identify when remediation standards have been met and are confirmed.
- Groundwater protection requirements (e.g.; monitoring, additional excavation) once remediation standards for surface exposure have been met.
- Cost estimates for remedial action.
- Opportunities for out-sourcing.
- Ability to identify processes that will lead to cost savings and efficiencies

3) Other uncertainties to be determined through the remedial design task or public comment if they may be addressed through this project as scoped.

Data Requirements

The data requirements were developed through the consensus of the extended project team, and are incorporated in table (1). The amount of data collected will be further determined in the test plan, and will ultimately be at the discretion of the Field Manager during operations.

Who will specify in greater detail what information is collected and where it will be documented.

Site Selection

The scope of the demonstration project includes remediation of 3 or 4 waste sites. Three primary sites have been selected by the extended project team with regulatory consensus. The three primary sites are the 116-B-4 french drain, the 116-B-5 crib, and a section of the 116-C-1 effluent disposal trench. Complications may be encountered that preclude early action at one or more of these sites (e.g.; interference with an existing paved road at 116-B-5). If it is determined that such complications can not be addressed within the time frame of the Demonstration Project, an equivalent site will be substituted.

If time allows, a non-IRM candidate site (e.g.; sanitary septic system, ash pit) may be addressed as part of the Demonstration Project. Non-IRM sites have not previously been investigated, The regulatory agencies and the extended project team have agreed that remediation of one non-IRM site would be useful to provide characterization and a model for remediation.	

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
Applicability (i.e., necessity and cost effectiveness) of treatment for volume reduction at specific sites.	Determine when treatment to achieve volume reduction is applicable at specific waste sites.	What are the criteria for determining when volume reduction is cost effective at a specific waste site?	1. Throughput required for treatment to not restrict excavation (i.e.; excavation rate in yd/hr). 2. Cost of disposal vs. Cost of treatment. Note: cost of treatment will be estimated based on the required throughput, not by implementing treatment.
		What are the criteria for determining when treatment is technically feasible at a specific site?	1. Gradation of soil. 2. Quantity of contaminated soil 3. Contaminant loading by fraction 4. Mineralogy
Can LDR waste be effectively managed during remediation.	Collect information to develop LDR protocols for RD/RA.	Can LDR material (soil) be identified in real-time (i.e.; <2 hours)	1. Analytic turn-around time required to detect LDR levels 2. What analytical methods are required to determine if LDR materials are present (total and leachable).
		Can LDR material be segregated?	1. Lay-down area required 2. Volume of LDR material

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
Remediation standards	What is applicability of the balancing criteria	What is the cost required to excavate contaminated soil above remediation standards for surface exposure in order to achieve groundwater protection?	1. Specific contaminant levels to predict decay 2. Estimated remaining contaminated soil volume 3. Assessment of impact to cultural resources, natural resources, and worker safety (i.e., what is the clean volume, depth, and area that are disturbed) 4. Soil parameters to support leach-ability testing and groundwater impact estimation (e.g., modeling) .
		What is the cost of leaving waste in place (e.g., long-term monitoring) to achieve groundwater protection?	No information will be collected to support this. Determination will be made through a cost estimation study. Coordinate with BC-5 to ensure GW information is collected.
System design	Support the design of a cost-effective and efficient system.	What is the efficiency of individual systems (excavation, material handling, packaging, disposal)?	1. Production rates 2. Down-time and causes 3. Reliability 4. Availability 5. Adaptability 6. Cost 7. Rework

Uncertainty	Objective	Specific Decisions to be Made for RD	Specific Information to be Collected
		How can integration of the system components be improved?	Evaluation of information collected above (the amount and type of information that will be collected will be determined through DQOS)
Accuracy of the cost estimates produced for the Focused Feasibility Studies.	Confirm cost estimate assumptions.	What is difference between estimated volume (using MCACES) and actual volume?	1) Assumption (e.g.; bulk density, sampling). 2) Waste sites input parameters.
Analytical Systems	Support development of full scale analytical system.	What is the most cost-effective analytical approach to guide remediation?	1) Production rates 2) Analytic turnaround times 3) Effect of waste site size on the analytical approach. 4) Comparison of analytical turn-around times versus concentration. 5) Boundary of contamination
		What is the most cost-effective approach to confirm remediation standards are achieved?	Data collected in above to be used in determining confirmation protocol.
Out-sourcing Opportunities	Identify systems for potential outsourcing.	Systems to be outsourced	1) costs 2) Specification (rates, hold points, integration with other system, interface requirements)